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by Timm Buchanan; Craig Eddy
Sams, Macmillan Computer Publishing
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Table of Contents

Introduction

by Craig Eddy

Welcome to *Sams Teach Yourself Access 2000 in 24 Hours*, a teach-yourself guide to one of the most widely-used desktop database management systems. In this book, you'll learn the basics of working with Access 2000 in 24 chapters that should take about one hour each to complete.

I first began working with Access back in the dark ages of Access 2.0. At the time, I was working as a hardware design engineer who had drifted into programming Windows-based tools to aid our engineering efforts. Most of what I did as an engineer involved databases of one kind or another: tracking parts available from manufacturers, parts we had in our inventory system, parts we had in stock, parts used on my projects, and so on. Because I was programming in Visual Basic, which contains all the tools necessary to manipulate Access databases, Access was the natural choice as a database.

Access has come a long way since version 2.0. The latest version, Access 2000, has Internet capabilities, the ability to work with a SQL Server back-end database, and a greatly improved built-in database engine.

The book you hold in your hands covers everything you need to know about Access 2000 up to a moderately advanced level. If you have no experience whatsoever with databases, have no fear. We cover all the basics of working with existing databases, as well as designing your own original databases. If you're already familiar with other database platforms, you'll still learn a lot from this book about working with databases in Access 2000.

We start by explaining how to familiarize yourself with an existing database. After the basics of working within the Access 2000 environment have been covered, we move on to modifying existing databases. Finally, we cover how to create a new database. In the closing sections of the book, you'll learn about some more advanced topics, such as combining Access with other Office 2000 applications or creating Web pages for your data.

The examples presented in this book are based on the Northwind Traders sample database that is included with Access 2000. This means that an accompanying CD-ROM is not necessary. These examples are based on the kinds of tables, queries, forms, and reports that will be familiar to most people who create databases for common business applications.

We certainly hope that you enjoy working with and learning from this book as much as we've enjoyed writing it. Your investment of time spent here will pay off greatly in the future. Good luck on your journey.

Conventions Used in This Book

This book uses different typefaces to differentiate between code and regular English, and also to help you identify important concepts.

Text that you type and text that should appear on your screen is presented in `monospace` type.

```
It will look like this to mimic the way text looks on your screen.
```

Placeholders for variables and expressions appear in *monospace italic* font. You should replace the placeholder with the specific value it represents.

This arrow (Ò) at the beginning of a line of code means that a single line of code is too long to fit on the printed page. Continue typing all characters after the Ò as though they were part of the preceding line.

Note: A Note presents interesting pieces of information related to the surrounding discussion.

Tip: A Tip offers advice or teaches an easier way to do something.

Caution: A Caution advises you about potential problems and helps you steer clear of disaster.

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Craig would like to thank, most of all, his wife and kids for all understanding why he was often stressed while trying to juggle writing, working, and running a business. In addition, Craig acknowledges the tremendous effort put forth by the team at Sams, especially Jonathan Gennick and Neil Rowe. Finally, many thanks to the wonderful team at Pipestream Technologies, who often endured a moody, sleep-deprived lead developer!

Dedication

To everyone in my family, and especially to Stacy. Without their love, support, guidance, and strength, I would not be the person I am today. Thanks to you all.

—Timm

Tell Us What You Think!

As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

As an Associate Publisher for Sams, I welcome your comments. You can fax, email, or write me directly to let me know what you did or didn't like about this book—as well as what we can do to make our books stronger.

Please note that I cannot help you with technical problems related to the topic of this book, and that due to the high volume of mail I receive, I might not be able to reply to every message.

When you write, please be sure to include this book's title and authors as well as your name and phone or fax number. I will carefully review your comments and share them with the authors and editors who worked on the book.

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Part I
Introduction to Access 2000

Hour

Hour 1
Introduction to Relational Databases

Craig Eddy

You are about to embark on a 24-hour journey through the heart of Microsoft Access 2000. When you have completed this journey, you will have a firm handle on how to use Access 2000 to solve your database needs. Whether you're a business professional, an engineer, or a programmer developing database applications, you'll find Access 2000 is an easy-to-use but full-featured database development tool.

Access can be used for everything from maintaining a simple list to implementing a full-featured accounting tool. Of course, what you can do with Access depends on what you put into the databases you develop. The purpose of this book is to provide you with the necessary knowledge and skills to effectively use Access to meet your needs.

The highlights of this hour follow:

- An introduction to just what Access 2000 is and does
- The ins and outs of relational databases
- The components that make up an Access database
- A little about the capabilities and limitations of Access 2000

- What's new and different in this version of Access

This journey is intended to give you a thorough introduction to building and using databases with Access 2000. After completing the first hour of the journey, you'll have the confidence and knowledge necessary to sail through the remainder of this book smoothly.

Access 2000: Not Just a Desktop Database Anymore

What is Access 2000? That question can be answered simply: Access 2000 is a relational database development tool. This section describes just what makes this so. By the end of this short section, you'll understand why Access is a relational database development tool.

First, Access is a database development tool. Databases enable you to collect any type of information for storage, searching, and retrieval. Access excels at being able to collect information through the use of either a Datasheet view or a custom form. The datasheet view, which you'll delve into in-depth in Hour 5, "Using the Datasheet View," provides a spreadsheet similar to Microsoft Excel. You can also create custom forms that look like all other Windows applications and use these to gather and retrieve information. In addition, Access allows you to create custom reports for printing or exporting the information stored in the database.

NEW TERM A *relational database* is a database that allows you to group its data into one or more distinct tables that can be related to one another by using fields common to each related table.

Secondly, Access provides data storage. Access 2000 gives you a choice for your database's physical storage (that is, where the data is actually stored). You can use the default desktop database file or Microsoft SQL Server to store your data.

Using the desktop database file, you can place the database file on a network file server and share the database with other users on your network. This method is not, however, a true client/server database because the Access database is a file stored on a hard drive, not a running application. This might seem like a disadvantage, but it really isn't. When Access is used in this environment, it has distinct advantages over client/server databases. First and foremost, it is very easy to administer. There aren't a lot of complicated settings or network and security issues to muddy the waters. You also don't need a Pentium 200 with 64MB of RAM to run Access 2000. So if you're a one-person shop, or you need a database which only a few people must access at a time, using the default desktop database file is the perfect choice.

NEW TERM *Client/server* is a term that describes two applications, typically running on two different computers, which communicate with one another. One computer, the server, provides data and other services for multiple other computers, the clients.

Finally, Access is a relational database tool. Relational databases are one of the most versatile types of databases ever developed.

As you can see, the fact that Access 2000 is a relational database development tool brings with it many advantages. You have the ease of use of a desktop database and the power of a relational database all in one package.

What Is a Relational Database, Anyway?

In a relational database, you can define relationships between the different data tables contained in the database. These relationships can then be used to perform complex searches and produce detailed reports.

Another advantage to relational databases is that they eliminate the need to store redundant information. For example, a mail-order business might use a relational database to track their customers and orders. The Northwind sample database that ships with Access 2000 is just such a database. Because the customer data already contains a customer's address and phone number, the database does not need to repeat that information with the order data. Instead, each order record is related to an existing customer record. The Northwind database has a field named `CustomerID` that is found in both the Orders table and the Customers table, as shown in Figure 1.1. This `CustomerID` field is used to define the relationship between the two tables. Relationships are discussed in detail in Hour 16, "Planning and Designing Your Database."

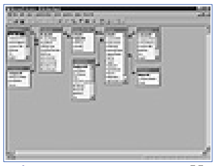

Figure 1.1 An illustration of related tables.

The remainder of this hour will provide an introduction to indexes, provide an overview of the many components of an Access database, and discuss the capabilities and limitations of an Access database.

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The How and Why of Indexes

Another feature that gives Access 2000 some added horsepower is the use of a database concept known as indexing. An index to a database is similar to the index at the back of this book. Just as you use the book's index to quickly find a topic of interest, Access uses an index to quickly locate the record for which it is searching. A book's index decreases the amount of time it takes a reader to find the necessary information. A database's indexes decrease the time it takes to perform its work.

NEW TERM An *index* is an ordered list of the data contained in a field or a group of fields within a table. The list is designed to be quickly searched by the database engine, just as a book's index is organized to be quickly searched alphabetically. This ordered list is maintained internally by the database engine and cannot be viewed or edited.

Access uses indexes to assist in performing its searches or lookups. When an index is provided and you attempt to search on the field that defines the index, Access does not need to look at each record in a table. Instead, it can use the index to quickly locate the value you are searching for and then identify the matching records.

Let me give you an example. The Customers table is shown in Figure 1.2. The Customers table has an index on the Company Name field. If you were searching for all the customers whose company name started with the letter D, Access would not have to look at each customer in the table. Instead, Access would move directly to the Ds in the Company Name index's ordered list. It would then see that the customers with Customer ID values `DRACD` and `DUMON` begin with D. These two records would then be returned as the results of your search.

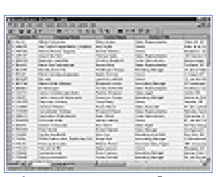

Figure 1.2 The Customers table in Datasheet view.

The data shown in Figure 1.2 is not very extensive. Even a mere human can quickly locate the customers whose Company Name begins with D in this list. However, a database is quite capable of storing tens of thousands of customer records. Without an index, even a computer could not examine each record quickly enough to be useful as a search engine. Indexes are the key to searching vast amounts of data in a timely manner.

Caution: Too much of a good thing can be dangerous as far as indexes are concerned. You should take care not to create too many indexes on your tables because doing so can degrade performance. You should only have indexes on fields that are most commonly queried upon. The index's ordered list must be maintained as records in the table are updated, inserted, or deleted.

Components of an Access Database

Because you already know that Access is a database tool, you know that it provides connectivity to a repository into which the data you want to store is placed. Access is a full-featured application development environment. This section discusses the objects that provide you with the capability of developing a complete database application using Access.

Don't let the number of different objects available in Access 2000 scare you off. Access provides wizards which are very helpful when creating your database's objects. You'll see wizards covered extensively throughout your journey. They're a great way to get started using Access 2000. In Hour 14, "Creating a Database Using Wizards," you'll learn about wizards in-depth.

Tables

The most obvious component of any database is the table object. This is where the actual data being stored is kept. A table is a collection of records that can be divided into fields. Each field holds a single piece of information about the record in which it resides.

Access tables can be viewed in either Datasheet view (see Figure 1.2) or Design view (see Figure 1.3). In Datasheet view, you enter the data for each record in the table. In the Design view, you define how the table operates.

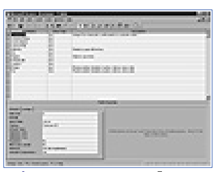

Figure 1.3 The Customers table in Design View.

The Datasheet view, as you can see in Figure 1.2, is similar to a spreadsheet. The columns in the datasheet represent the fields in the table. There is one row for each record stored in the database. You'll learn more about using the Datasheet view in Hour 5.

The Design view is used to set the properties for the entire table and for each individual field. These properties include the field names, the data type used for each field, and the indexes defined for the table, among other items. In Hour 10, "Modifying an Existing Table," you'll learn more about the Table Design View window.

Queries and Views

In a database you use a query (or view, depending on the data storage platform) to search, view, and modify the data that exists in the tables. You can also use queries to modify the structure of the tables or to access data that is external to the Access database.

The term view is synonymous with query; they perform the same function. In SQL Server, the object is called a view. When using the default Access 2000 data storage mechanism, the object is called a query.

The typical query is used to return data that meets specific criteria. These queries can be viewed in Datasheet view or can be used as the source of data for forms and reports that are created in the database. In addition to providing the capability to search on specific criteria, queries can also be used to summarize and analyze data. The Northwind database has a query named Sales by Category. This query summarizes data from the Products, Categories, Orders and Order Details tables to produce the datasheet view shown in Figure 1.4.

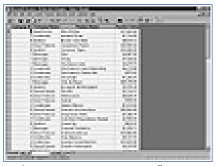

Figure 1.4 The Datasheet view for the Sales by Category query.

Like tables, queries also have a Design View window. Actually, queries have two different design views: the Design Grid (see Figure 1.5) and the SQL View (see Figure 1.6). The Design Grid provides you with a user-friendly means of creating and modifying queries. The SQL View allows you to modify the actual code used to define the query using Structured Query Language. This is a computer language that is used when (surprise!) you create database queries. You'll learn more about these views in Hour 7, "Using Existing Queries."

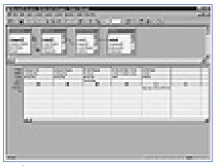

Figure 1.5 A query's Design Grid View.

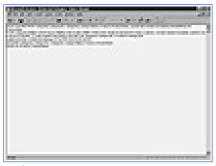

Figure 1.6 A query's SQL View.

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Forms

One of the most powerful features of Access 2000 is the capability to create forms that can be used to enter, edit, and search your data. After a form is created, it looks and operates like a Windows application. The Products form from the Northwind database is shown in Figure 1.7.

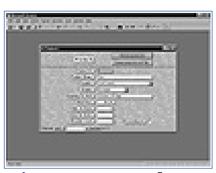

Figure 1.7 The Northwind database's Products form.

As you can see in Figure 1.7, the form contains text boxes for data entry, labels to identify the various elements on the form, and buttons to perform other actions.

The form also has a record selector. This is the series of buttons on the bottom edge of the form. The record selector allows you to navigate among the records in the underlying data. The form in Figure 1.7 uses the Products table as its data source. Using the record selector will move you from one product to another and change the data on the form accordingly.

You'll learn more about forms in Hour 8, "Editing Data in Forms," and in Hour 12, "Modifying an Existing Form Design."

Reports

What good is all the data you enter into a database if you can't share it with someone else? Reports enable you to output data to any number of destinations (such as your printer or an email message) in an easy-to-read format. You can send reports to a printer or you can export the report to any number of formats. You can even publish your reports on the Internet or your company's intranet.

Reports, like forms, use an underlying data source, either a table or a query, to provide the actual data. The report's design dictates how the data will be presented when the report is printed, previewed, or exported. Figure 1.8 shows the Print Preview window for the Northwind database's Products by Category report.

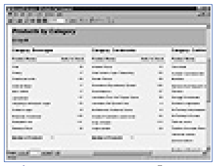

Figure 1.8 The Products by Category report in the Print Preview window.

You'll learn more about reports in Hour 9, "Displaying Data in Reports," and in Hour 13, "Modifying an Existing Report."

Data Access Pages

Data Access Pages are Web pages that you can create and link to an Access database. These pages can query or update the data contained within the database and are very similar to Access forms. Data Access Pages require Internet Explorer 5.0 to operate. Whereas Data Access Pages are stored within the file system as opposed to within the Access database itself, Access provides all the tools required to create and edit them. Figure 1.9 shows a data access page created for the Products table, viewed in Internet Explorer 5.0. This page is saved as "View Products" in the Northwind database.

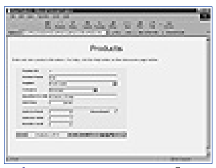

Figure 1.9 A data access page for the Products table.

Macros and Modules

Finally, Access provides the capability of creating and using macros and modules. These help produce the action side of a database. They provide a means of acting upon and utilizing the tables, queries, forms, and reports that exist within a database.

Macros are simply a set of actions that each performs a specific task within the Access 2000 project. You can define a macro to open a specific report in the Print Preview window, for example. Macros are useful in automating Access 2000. You'll learn more about macros in Hour 21, "Creating Macros."

Modules are collections of Visual Basic for Applications (VBA) procedures. Access 2000 uses the same built-in programming language as the other Microsoft Office applications. Developing in VBA is essentially identical to Microsoft's popular application development tool, Visual Basic. VBA as a language is a subset of the standard Visual Basic language. VBA in Access 2000 allows you to create your own custom functions and procedures. You can also programmatically control Access 2000's underlying database engine. This allows you to, for example, work with data one record at a time and perform some operation on each record.

Modules and VBA are beyond the scope of this particular book. However, if you would like more information on them, *Sams Teach Yourself Access 2000 in 21 Days* or *Access 2000 Unleashed*, also published by Sams Publishing, provide excellent coverage on these topics.

The Limitations of Access 2000's Data Store

Hopefully, by the time you've gotten to this point in your first hour, you've come to realize that Access 2000 is a powerful database development tool. However, there are some definite limitations and drawbacks to keep in mind when using Access 2000's desktop database file. You should consider some of these points when choosing how you will deploy your database.

For example, Access 2000 has no built-in backup process. Microsoft SQL Server has built-in backup capabilities and does not require all users to exit the database before the backup can proceed. Access does require the database file to be closed by all users before it can be manually backed up. If you're using mission-critical data, you might want to consider this point. Of course, there are automated backup procedures that can back up the database file as long as all users have closed their connection to the database.

Second, the default Access data store has a limit of 1.2 gigabytes of data per database. For a desktop database, that's a lot of data. For an Order Entry and Inventory database for a large corporation, that's probably not going to be enough storage space.

Third, Access 2000 has a limit of 255 total users connected to the default store. Again, if you're in a large network environment with hundreds or even thousands of users who must have access to the data, you'll probably need to choose a different database storage mechanism such as SQL Server.

Fortunately, as you'll see in the next section, Access 2000 can serve as a front-end tool working against a SQL Server back-end database. This allows you to overcome these limitations while still working with a user-friendly but powerful database development tool.

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What's New in Access 2000

Although this book is intended for users who are new to Access 2000, chances are most people have heard about some of the capabilities of previous versions of Microsoft Access. This section describes some the new features brought to the table with Office 2000 in general and Access 2000 in particular.

Some of the new features include:

- **Access Projects:** Now you can use Microsoft Access as a front-end database development tool without actually storing the data in the Access file. The Access Project file contains the forms, reports, macros, modules and Data Access Pages. The file contains no tables, queries, or views. These are kept in the back-end database.
- **Choice of back-end database:** With Access 2000, Microsoft has finally taken Access beyond the realm of being simply a desktop database. As you'll learn throughout this book, you can now use Access to develop databases in a client/server environment such as Microsoft's SQL Server. This opens the Access developer to a whole new world of opportunities and capabilities. No longer is Access relegated to the world of data suitable only for a stand-alone computer. You can now use Access as a full-featured development tool for high-powered database platforms.
- **Data Access pages:** Data Access Pages are Web pages that you can create and link to an Access database. These were described in an earlier section in this hour.
- **Friendlier user interface in the Database window:** The main window used in Access has been made more user-friendly. For example, menus have been segregated into sets of commonly used and less-used items. Also, you can have Access automatically move menu items you use most often to the top of the menu.
- **Subdatasheets:** Using subdatasheets allows you to view data in a hierarchical mode. You can drill down to related data. For example, when viewing orders in a datasheet, you can drill down to the line items on the order within the same datasheet.
- **Web Folders:** This is a new feature of Office 2000 that allows you to link your Windows Explorer file system to Web servers. If the Web server supports the FrontPage extensions, you can open and save Access databases (and any other file) on a Web server easily using Web Folders.
- **Office Clipboard:** Using the new Office Clipboard, you can copy multiple items, at different times and from different applications, and paste them all at one time.

Summary

This hour has provided an introduction to Access 2000 and its components. By now you should be in a position to move on to the next hour, “Installing Access 2000 and Choosing a Data Store,” where you’ll learn about installing and choosing a back-end data storage mechanism.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you’ve learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A, “Quiz Answers.”

Q&A

Q **How did you create the Order Entry database?**

A Run Access 2000. In the initial dialog box, select the Access database wizards, pages, and projects option button in the Create A New Database Using option group. Select the `Order Entry` icon in the New Database dialog that appears next and follow the steps the Database Wizard provides. If you do not see the Access database wizards, pages, and projects choice, you did not install that wizard when you installed Access 2000. Refer to Hour 2 for details on doing so.

Q **Do all the tables in my database need to be related in some way?**

A No. You can have tables that are not related to any other table. However, you’ll find that this will be a rare case because your data will almost always be interrelated in some way.

Q **Does creating an index for a field require that the field contain unique values throughout all the data stored in the table?**

A No. You can create indexes on fields regardless of the data that will be contained in the field. However, you can create a unique index that requires such uniqueness. This is a property of the index. A special index known as a primary key is a unique index that can be used to identify each record in a table.

Q **I have a form which I would like to use to print the data for more than one record. Can this be done?**

A The best way to do this is to create a report based on this form. You can do this easily by selecting the form in the database window, right-clicking the mouse, and selecting Save As Report from the shortcut menu. The form will be converted to a report that can be used like any other report.

Quiz

1. What, exactly, is Access 2000?
2. What is the primary purpose for using an index?
3. What is the primary purpose of a query or view?
4. What is the maximum size of the default data store for an Access 2000 database?

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Hour 2
A Quick Tour of Access 2000

Timothy Buchanan

This hour gives you a quick tour of the various windows and dialog boxes that Access 2000 uses. Even if you already are familiar with previous versions of Access, it is a good idea to take a look at the changes that Access 2000 brings.

The highlights of this hour include

- How to install Access
- Different ways to start Access
- Opening databases
- Looking around the database window
- Main database objects and their relationships
- Closing, saving, and backing up a database
- Exiting Access

Before You Install Access 2000

Access 2000 will need to be installed on your computer before you can use it. The whole process is simple, and you should be using Access 2000 within 30 minutes of starting the installation process. If you choose to install Access 2000 along with the other applications in Office 2000, allow 45 minutes or more for a full installation. The Access 2000 installation process is similar to other Windows 98 products.

Note: Although installation is a relatively easy thing to do, if you are installing it on your company's computer, there might be some considerations you need to know about before you install Access. It is a good idea to check with the department that handles your computer systems to see whether any special circumstances exist.

Software and Hardware Requirements

To run Access 2000 comfortably and successfully, you need an IBM or compatible computer with a Pentium or higher processor and 16 megabytes (MB) of RAM over and above any RAM required by your operating system. I recommend a Pentium 90 or better with at least 32MB of RAM. The more RAM you have, the more applications can be run simultaneously and the better your overall performance will be. You also need between 25 and 75MB of hard drive space, depending on what you choose to install with Access 2000. If you install all the applications in Office 2000, you will need a minimum of 250MB of free hard drive space. You will also need room for all the databases you will be creating. Access 2000 also requires at least a VGA monitor, although an SVGA monitor would be much better. A fast video card is also recommended. A mouse or other pointing device is required to do any work with Access 2000, and if you want to print anything from Access, a printer or access to a printer across your network is required.

Note: Access 2000 requires that Windows 95, Windows 98, or Windows NT be installed on your computer. Windows does not come with Access 2000; it must be purchased and installed separately. The rest of this chapter assumes you are using Windows 98 as your operating system. All Office 2000 products also require that Internet Explorer 5.0 be installed on your PC. You can install it at the same time as you install Office or Access 2000, or install it at a different time.

Upgrading to Access 2000 from Access 2.0 or Access 95

If you already own a copy of Microsoft Access 95 or Access 97, you can purchase and install an upgrade version of Access 2000. If you do not own any of the previous versions of Access, you need to purchase a regular copy of Access 2000. Before you decide to upgrade any databases that were created in previous versions of Access, you should consider a few things. First, although you can still open a database that was created in a previous version of Access, you cannot make any design changes to that database until it has been converted to Access 2000. You can change data contained within the database, though. If you will be working with other people who will still be using a previous version of Access, and you need to make design changes to the databases you share with them, you might want to install the older version in a separate place on your computer. That way, you can work with both versions of your database.

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by Timm Buchanan; Craig Eddy
Sams, Macmillan Computer Publishing
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Installing Access 2000

1. Now select Run from the Windows 98 Start menu.

2. Either type in the default setup path to run the Access 2000 setup program, which is usually D:\setup, (D being the letter of your CD-ROM or floppy disk drive), or run Windows Explorer and select the proper drive there and run the Setup program.

3. The setup program first collects information about your PC and how it is set up. The first screen, seen in Figure 2.1, asks for user information, including User Name, Initials, Organization, and CD Key. The CD Key is found on the back of the CD case. You will not be able to install any programs without this security CD Key entered properly. This is your proof of ownership, and you will be asked for it if you call for support, so keep the CD-ROM in a safe place, or at least write down the CD KEY. Select Next to continue.

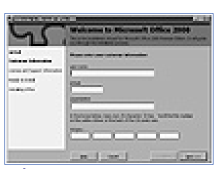

Figure 2.1 Access Setup information screen.

4. The next screen that Setup displays is your End-User license agreement. This is shown in Figure 2.2. Read the agreement carefully, select the button stating that you accept the License Agreement terms, and hit Next to continue.

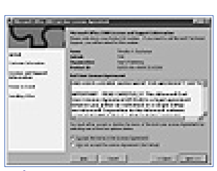

Figure 2.2 Access end-user agreement.

5. The next screen, shown in Figure 2.3, has two options, Install Now, and Customize. For a normal installation, click the Install Now button, and Access (or Office) will be installed with the most frequently used options. If you click the Customize button, you can select other features be installed at this time. For now, go ahead and click the Install Now button. If you try to use an option later that has not been installed, Access will ask you if you want to install it. If you say yes, Access will install it for you. Click the Next button to continue.

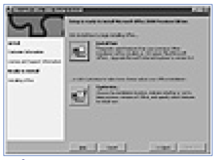

Figure 2.3 Access Setup program.

6. Setup will check to see whether any existing copies of Access or other Office components are on your system. You can keep these earlier versions on your PC, or you can remove them after you install the newer version. The Windows Control Panel has an Add/Remove Applications Utility you can use for this purpose. In Figure 2.4, you can see that the install program checks to see whether any other applications are running. You will need to shut any other applications down before continuing with the install process.

Figure 2.4 Access setup program.

7. After the install program finishes copying files, it will need to restart your computer. This is shown in Figure 2.5. Select Yes to continue.

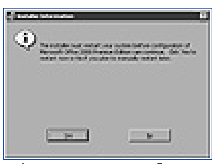

Figure 2.5 The Access Setup program must restaart your computer

Depending on what options you have selected, the installation could take anywhere from 20 to 60 minutes. While the installation is taking place, a series of pictures and notes appears on your screen giving information about different features of Access 2000, and how you can use them. When the installation is complete, the install program must restart your computer. This is shown in Figure 2.5. After you select Yes to continue, Windows is restarted, and you are returned to the Windows 98 desktop. After rebooting, Setup will finish updating your registry and start menu. This could take up to 15 minutes depending on your PC. Now you are ready to try out your new applications. A new program in your Start menu is named Microsoft Access.

Choosing Your Database Platform

With the introduction of Access 2000, users of Access can now develop and manipulate SQL Server-compatible databases in addition to the standard Access database files. The choice of which engine to use depends on the intent and size of the database, as well as the technical resources you have at your disposal. This section briefly discusses the reasons you might choose one or the other platform.

Access 2000 has two native database platforms from which to choose: JET and the Microsoft Data Engine (MSDE). The JET platform has been the standard platform for Access databases since Access was first introduced. The version included with Access 2000 (JET 4.0) is much improved over previous versions. The MSDE is a database engine for Windows 95/98 that’s compatible with the SQL Server 7.0 code base. This means that all of the features found in SQL Server 7.0 are included in the MSDE, but the MSDE can be run on Windows 95/98 machines (SQL Server 7.0 requires Windows NT).

When deciding which platform to use, there are a number of factors to consider. First and foremost is your experience and your environment. If you’re developing databases for single or a few concurrent users, or if you’re completely new to databases in general or Access 2000 in particular, you should stick with the standard JET engine. If scalability of data and number of users is now or might be in the future an issue, you should start with the MSDE.

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Factors Affecting Your Platform Decision

There are four factors which you should consider if the decision is still up in the air: simplicity, data integrity, number of simultaneous users, and the amount of data.

On the simplicity issue, the hands-down winner is the JET platform (which is why I recommend it for those new to database development or Access 2000). The requirements for system resources, disk space, and administration are very low compared with the MSDE.

If data integrity is a major concern, then the MSDE should be chosen. The MSDE, because it's built on the SQL Server 7.0 code base, is a client/server data engine. JET, on the other hand, is a file-server data engine. This means that with the MSDE there is an application running behind the scenes to handle the transfer of data from Access 2000 to the physical data storage. This engine performs such tasks as logging database transactions and ensuring transaction integrity. There is also some built-in fault tolerance with the MSDE. In general, the more important it is that your database be available 24 hours a day, seven days a week, the more likely you are to choose the MSDE.

The third concern, number of simultaneous users, is often difficult to address at the start of a new project. What starts out as a database intended for a few users can quickly blossom to one being used by hundreds. If this is a possibility, your best bet is to start with the MSDE. Likewise, if you wish to use the Windows NT security model with your database, the MSDE provides this integration. JET does not. If you get beyond the hundreds of users mark, your best bet is a dedicated SQL Server machine (remember, MSDE databases are fully compatible with SQL Server, so upsizing them is not an issue).

Finally, there are definite differences in the amount of data accessible by each platform. The JET platform has a maximum databases size of 2 GB (gigabytes) while the MSDE platform can go into the terabyte range (a terabyte is 1000 gigabytes). If your database will grow beyond 2 GB, choose the MSDE platform.

Even if you decide, as I recommend, to stick with the JET engine for now, Microsoft provides the Access Upsizing Wizard with the Office Professional Edition. This wizard will recreate your JET database on a SQL Server.

Installing the MSDE Platform

While I recommend that you stick with the JET platform for now, and indeed the bulk of this book in general covers the JET platform only, you may have a need to install the MSDE platform on your machine. Microsoft will probably make the steps required to do so a little more streamlined in the future, but as of this writing these are the steps to follow.

First off, the MSDE platform is not available in the normal Office 2000 installation program. To install the MSDE platform, locate the CD containing the Office Server Edition (OSE) and Resource Kit. Under the OSE directory on CD 1 is a directory named SQL. This directory contains an x86 directory, which in turn contains a Setup directory. Browse to this directory with Windows Explorer and execute `setupsql.exe`.

The first two dialogs are standard setup application dialogs. On the third dialog you specify where you wish the program files and data files to be installed. Usually the defaults are fine. On the fourth dialog, there are a slew of settings that control how data is stored in the database, how it's sorted and searched, and how data is handled in Unicode environments (Unicode is a character set that has enough characters for most of the languages in use today). To make the database work like a JET database, leave the default choices.

Caution: If you make the incorrect choices on this dialog, and later need to correct them, you'll have to rebuild all of your databases and reload the data into them. Not a pretty task, so if you're unsure about any of these choices, refer to the Help file (there's a Help button on the dialog) or a SQL Server administration text.

In the next dialog you specify which network protocols the MSDE will use to handle network traffic. Because the MSDE is not a file-server database, but a client/server database, it cannot use the network file system to communicate with other machines. Instead, it has its own data transport mechanism. The MSDE can communicate using multiple protocols, but only choose those protocols in use on your network. If you have any concerns, consult the Help file (there's a Help button on the dialog) or your network administrator.

The last dialog simply informs you that the setup application is ready to begin copying the necessary files to your machine. Click Next and it will do so. After the files are copied, the setup application will start and stop the database engine a few times and finally display a dialog informing you that the installation was a success.

The MSDE does not ship with any SQL Server management tools other than the SQL Server Service Manager. This application runs either in a window or as a system tray application (the area where you see the clock and other small icons). The Service Manager allows you to stop and start the MSDE. A shortcut to it is placed in your Startup folder so it will run each time you restart your computer.

In Hour 4, "Understanding Someone Else's Database," you'll learn how to open or create a database on your new MSDE server. You must make sure that the server is running before you attempt to open or create a database there (the Service Manager makes this simple).

Note: The server is installed with a single user, `sa`, having a blank password.

Starting Access 2000 and Opening a Database

There are several ways to start Access 2000. The easiest way is with the Windows Start button. If you have Microsoft Office, you can also start an Access database from the Office toolbar.

KEYWORD SEARCH

GO!

Search Tips

Advanced Search

PUBLICATION LOOKUP

GO!

Title

JUMP TO TOPIC

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GO!

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Start Menu

When you install Access 2000, a shortcut to Access 2000 is added to the Start button's Programs menu. The easiest way to start Access is to click the Start button, select Programs, and then select Microsoft Access. This starts Access 2000 and displays the Access startup screen.

Windows Explorer

You also can select the database you want to load using Windows Explorer. Simply select the database you want to load, double-click the filename, and Windows will start Access 2000 with the database you selected open. Access 2000 databases usually have the .MDB file extension. If you already have Access running when you double-click a database file in Windows Explorer, Windows will start another copy of Access 2000, and open the database you selected. You are allowed to open multiple databases at the same time, using concurrent instances of Access 2000. However, it will not let you open the same database more than once.

Microsoft Office Toolbar

When you install Microsoft Office and do not customize your installation, an Office shortcut toolbar will automatically load whenever you start Windows. There are two ways to start Access 2000 from this toolbar. You can either select Start a New Document, and choose Blank Access Database, or you can select Open a Document, and select a database you have already created.

Opening a Database from Within Access

When you load Access, the first screen you see asks you whether you would like to open a database, or create a new database, as shown in Figure 2.6. From this menu, you can select the radio button next to Blank Database to create a new database. If you select Access Database Wizards, Pages, and Projects, a wizard that asks you different questions about the database you want to create, and helps you to create the basic elements will run. If you select Open an Existing File, Access asks you which database you want to open. If the database you want is not shown in the list, select More Files. Access will enable you to choose which database you want to open.

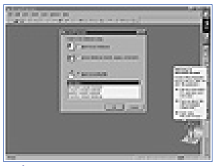

Figure 2.6 Opening an Access database.

Note: Don't worry about that strange-looking paper clip character on the bottom of your screen. That is the new version of the Office Assistant, and you will learn about it in Hour 3, "Getting Help with Help Systems." You can click Cancel at this screen, and still open a database later.

Opening a Sample Database

The sample database used in this book is included with Access 2000, and is called Northwind. To open this database, select the Open an Existing File option and click the Northwind Sample database option.

Tip: Even if you did not select to install the Northwind database, you can still try to open it under the Open an Existing File option. Access will ask you if you would like to install it now. Make sure your Access or Office CD is in your CD-ROM drive and click Yes.

Clicking the Northwind database file and selecting the Open button, or just double-clicking Northwind, opens the Northwind database. The Northwind Traders opening screen loads as shown in Figure 2.7.

Figure 2.7 Northwind Traders database splash screen.

This splash screen lets you know you have opened the Northwind database and explains a little about the database. You can either click OK to continue, or if you don't want to see this screen the next time you open the Northwind database, select the check box titled Don't Show This Screen Again, and click OK.

The Access Window

The screen you see in Figure 2.8 is an example of the Access window. This is the Northwind database with the database window maximized. The Access window is the center of all activity regarding your database, and consists of several elements.

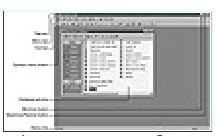

Figure 2.8 The Access window.

The Access 2000 Title Bar

The database window always displays the name of the currently open database in the title bar.

The System Menu Button

The System Menu button is located in the upper-left corner of the application window, and has the new Microsoft Access 2000 icon, which is a picture of a key on it. When you click this button once, a menu appears that allows you to perform certain tasks, such as restore, move, size, minimize, maximize, and close Access. When you double-click the System Menu button, Access closes automatically.

The Minimize and Maximize Buttons

The Minimize button is located in the upper-right corner of the screen, and has a picture of a line on it. When you click this button, your application is still running, but it is minimized. You can restore the screen by selecting it from the taskbar. The Restore/Maximize button can be used to maximize your application if it is only taking up part of the screen, or it will restore the screen to its previous size if it is already maximized.

The Close Button

The button in the upper-right with the X on it is the close button. This will close Access when clicked, just as if you used the File, Exit menu option.

Menu Bar

The menu bar contains all the various menu choices. When you click one choice, a menu drops down with more choices. The choices will depend on what you are doing in Access at that time.

Toolbar

The toolbar is located directly below the menu bar, and is a group of picture buttons that provide shortcuts to many of the menu bar commands. Depending on where you are in Access, and what you are doing, the pictures will vary. The toolbar can be resized and moved to different places on the screen. To move a toolbar, click and hold the cursor on the vertical bar on the far left of the toolbar you want to move. Position it where you would like it to be. Release the mouse button to drop it into place. By selecting View, Toolbars, you can show, hide, select new, or customize other toolbars, and pick between large and small icons.

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The Database Window

The database window has two main parts. A list of the types of objects are displayed on the left side of the Database window, whereas the right side of the window displays a list of the objects of the type selected on the left. The list on the left side of the window is called by some the “Folder Bar,” similar to the folder bar in Outlook 2000. This list contains two sections. The top selection, labeled Objects, contains Tables, Queries, Forms, Reports, Pages, Macros, and Modules. The lower section, labeled Groups, contains a group named Favorites. Groups are containers where you can place often-used database objects. To add a new group, simply right click over the Folder Bar and select New Group from the shortcut menu. A New Group dialog box appears, requesting a name for the new group. Enter a name and click the OK button. Now you can drag and drop objects from other lists in the Database window (such as Reports or Queries) onto the new group. To see the contents of a group, simply click its entry in the Folder Bar.

The Tables item is the default selection, and you see the different tables that the Northwind database uses. The command buttons are used to place the database object in a different view. You can open, design, or create a new object with these buttons. The list of objects displays a list of all the existing objects of that type in the current database. To display or design an object, you select the name of the object from that list.

Note: You also can change the way you view the objects in the list by selecting View from the database window menu bar. The four choices are Large Icons, Small Icons, List, and Details.

Status Line

The status line is located at the bottom left of the screen. The left side is reserved for displaying information helpful to whatever you are doing at the time. The right side displays the status of various keyboard settings, such as Caps Lock and Num Lock.

The Seven Main Access Database Objects

To understand how to use Access, you must first understand a few basic database concepts. A database is a collection of information regarding a certain topic. A database will help you organize this information in a logical manner for easy understanding. The database in Access is a term for the container that holds all the data and its associated objects. The seven main objects in Access include tables, queries, forms, reports, pages, macros, and modules. Although some other computer database programs might call the object that actually holds the data a database, Access calls this object a table.

Access can only work with one database at a time, but in that database can be hundreds of objects, such as tables, queries, and forms. They all are stored in one Access file. The heart of the Access database is the table.

Tables

A table is used to hold the raw data of the database. You enter your data into tables. Next the table organizes this data into rows and columns. The table list is the default view when you open a database in Access.

Queries

A query is used to extract only certain information from a database. A query can select groups of records that fulfill certain conditions. Forms can use queries so only certain information will appear on the screen. Reports can use queries to print only certain records. Queries can be based on tables or on other queries. Queries can be used to select, change, add, or delete records in your database. An example of a query in the Northwind database is shown in Figure 2.9.

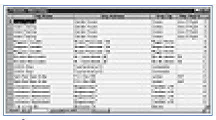

Figure 2.9 A query from the Northwind database.

Forms

Forms can be used in a variety of ways, but the most common ways are as data entry and for display. Data entry forms are used to help users enter data into tables quickly, accurately, and easily. Forms display data in a more structured way than a normal table does. You can change, add, delete, or view records from a table using a form. Display forms are used for the selective display of certain information from a given table. An example of a typical form in the Northwind database (the Sales Analysis form, to be exact) is shown in Figure 2.10.

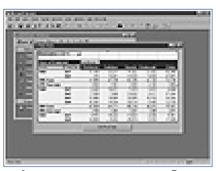

Figure 2.10 The Sales Analysis form from the Northwind database.

Reports

Reports present the data you select in a printed format. Reports can be based on tables to show all the data from the given table, or they can be based on queries to show only information that meets certain criteria. The reports can also be based on multiple tables and queries to show complex relationships that exist in your data. Access has many default reports that you can easily create to display your data in any way you might require. An example of a report in the Northwind database is shown in Figure 2.11.

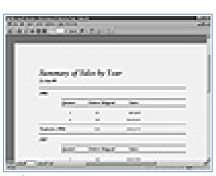

Figure 2.11 Example report from Northwind database.

Pages

Pages are new to Access 2000, and are more formally called *Data Access Pages*. Pages are HTML documents that can be bound directly to data in a database. These documents are very similar to Access forms, but they are designed to be viewed with Internet Explorer. One big difference between Data Access Pages and forms is that the Pages are saved to a different file than the Access database, whereas forms are stored within your database file. This is because the Pages are designed to be used with an Internet browser (specifically for

Internet Explorer 5.0) and they make use of dynamic HTML. An example of a Page is shown in Figure 2.12.

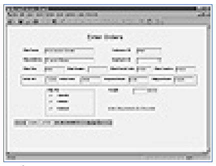

Figure 2.12 An example of a Data Access Page, a feature new to Access 2000.

Note: To use and design Data Access Pages, you must have Microsoft Internet Explorer 5.0 installed on your PC. Earlier versions of Internet Explorer will not work with these pages. For more information on how to link your Access database to the Web using Data Access Pages, see Hour 24, "Access 2000 and the Web."

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Macros

Macros help automate repetitive tasks without having to write complex code or learn a programming language. You will be introduced to macros in Hour 21, "Creating Macros."

Modules

Modules are user-written functions using Visual Basic for Applications. This book does not cover modules. A good source on modules is *Access 2000 Unleashed* by Sams Publishing.

Relationships

There are a few things to think about before you design your first database. One very important tool is relationships. Figure 2.13 shows the relationship diagram for the Northwind database. This can be a tricky topic, but it is important to the overall design and function of your database. I will go into more detail later, but for now here are a few items to think about. Tables should be related to each other so information in one table can be accessed by other tables. Most of the time, several tables will be related to one another. These tables are related by having certain fields in each table that share common values. The field names do not have to be the same, but the values have to match. Using good table and relationship design helps prevent you from storing the same data in two different places. Eliminating duplicate date not only saves time, but helps keep your data accurate as well. This might seem complicated right now, but keep it in mind as you continue throughout the book.

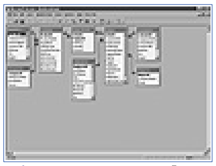

Figure 2.13 The Northwind database Relationship diagram.

Saving, Backing Up Databases, and Exiting Access

When you are done working on your database, there are several ways to quit Access. You can choose Exit from the File menu, click the Close button at the top right of the title bar, or double-click the command button. Just make sure you never simply turn off your computer without closing Access first. You will corrupt your database, and you might lose data. If you want to turn off your computer when you are done with Access, you must first exit Access, go to the Start menu, and then shut down to avoid a loss of data. It is always a good idea to back up your database often. If you keep a copy of important databases in two different locations, the chance of a complete loss of information is greatly reduced. You will also want to back up the Northwind database before you begin to work with it. To back up this database, you need to use Windows Explorer as your Web browser. In Explorer, select the Northwind files, as shown in Figure 2.14. Click on the database file you want to back up and drag it to the directory in which you want to save the database files. It is also a good idea to back up very important databases on a floppy disk, or onto your network hard drive if you have access to one. Keep a copy on floppy disk at a different location than your PC in case of fire or other damage.

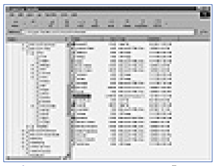
Figure 2.14 The Northwind database Access files in the Windows Explorer.

Caution: Remember to always exit Access properly, or you run the risk of losing data!

Summary

This hour provides a quick tour of what Access 2000 has to offer. This chapter samples the various windows and dialog boxes that Access 2000 uses, as well as a few topics you should think about before designing your first database. You should now know how to install Access, open and close a database, and exit Access. Keep in mind that Access 2000 has many more things to offer.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **Why are tables so important to Access?**

A They not only hold the raw data that all objects use, they also use relationships to maintain data integrity and accuracy.

Q **Why do I need to exit Access before I shut off my computer?**

A Access has many different internal files open when it is running, and if you shut off the computer before saving and exiting Access properly, these files are left open, and database corruption and data loss can result.

Q **Can I run Access 97 and Access 2000 at the same time?**

A You can have both versions on your computer at one time, but databases created in Access 2000 cannot be used in versions of Access prior to Access 97. Also, any databases created in earlier versions of Access can only have their data modified (but not their database design) in Access 2000 until you convert them.

Quiz

1. Why are relationships between objects important to the design of your database?
2. What are the seven main database objects used in Access 2000?
3. How do you save your database in Access 2000?

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Hour 3
Getting Help with Help Systems

Timothy Buchanan

In this hour, I explain how to find topic information using the online Help systems. After you complete this hour, you will be able to find help and more information on any Access 2000 topic. Topics for this hour include the following:

- Using the Office Assistant
- Getting help using the standard Help menus
- Browsing Help using Contents and Index

Examining Ways to Get Help

Now that you know the basics of starting Access, you probably need some help learning more about the program. Online Help systems provide a reference tool and information about various Access tasks. The questions you might have can be answered in many ways, and several online functions are available to help you:

- Office Assistant
- Standard Windows Help menus
- Screen tips

Many of the examples in this chapter make use of the Northwind sample database that ships with Access 2000. If you haven't already done so, you might want to open it so that you can follow along.

Note: Hour 2, "A Quick Tour of Access 2000," explained how to start Access and open the Northwind sample database. To open the Northwind database, start Access, select the Open an Existing Database option, and double-click the More Files option. The Northwind database default location when Access 2000 is installed with Office 2000 is C:\Program Files\Microsoft Office\Office\Samples. It might be in a different location on your PC.

Using the Office Assistant

One of the first things you notice when starting Access 2000 is a new, curious-looking creature in a box at the bottom right-hand corner of the screen. This is the Office Assistant—a feature in all the applications in the Office 2000 suite. His main function is to help you with any questions or problems you might have with any Office 2000 product. To activate the Office Assistant, click on him with your mouse. After you click the Office Assistant, press F1, or select Help, Microsoft Access, a menu is displayed by the Office Assistant listing several options, as shown in Figure 3.1. Your list might look slightly different, depending on your setup. You can also press F1 to open the Office Assistant.

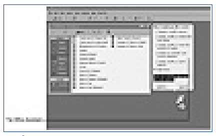

Figure 3.1 Using the Office Assistant menu.

Note: The screen shots in this book might look different from the screen on your PC. Different resolution settings, colors, and choice of Office Assistant can make the screen shots different from what you are viewing on your own PC. Don't worry about the differences; just concentrate on the information I discuss.

Under the heading "What would you like to do?," a few context-sensitive Help topics are listed that are relevant to what you currently are doing in Access. You can view even more topics by clicking the See More topic at the bottom of the list. Below this option is a text box with room for you to type a request or Help question. If you need help but are not exactly sure which Help topic you should select, this is a good place to start. You can type a question using plain English, without relying on technical language. Or, you can just type one or two words related to the Help topic for which you are searching, as shown in Figure 3.2. After you finish typing, click the Search button. You then see Help topics that are related to the question you typed.

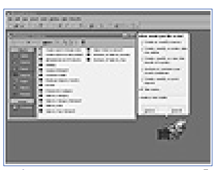

Figure 3.2 Searching for a Help topic.

You can click the Options button to change the capabilities and functions of the Office Assistant. If the Office Assistant is not set up to open when you hit F1, you can select Help, Show the Office Assistant from the menu.

Note: The default Office Assistant is Rocky the Dog, but you can change your Office Assistant by right-clicking him and clicking Options or Choose Assistant. You can choose from a number of different Assistants, including an Albert Einstein assistant, a bouncing rubber ball, Mother Nature, or F1 the robot. They all work the same way, but are a rather amusing distraction, so have some fun, play around with them, and see the different animations they each provide.

Using the Help Topics Dialog Box

If you get a little annoyed with the Office Assistant, the standard Windows 98 Help systems are also available. You can turn the Office Assistant off using the Options button. With the Office Assistant turned off, you can choose Help, Microsoft Access Help; or hit F1 to display Access's Help Topics dialog box, as shown in Figure 3.3.

Figure 3.3 The Microsoft Access Help dialog box with the Contents tab selected.

The Help Topics dialog box shows you a few ways to get started with Access 2000. This dialog box offers three options:

- **Contents:** Displays the default view in the table of contents, as shown in Figure 3.3. After you click a topic, a menu of subtopics appears.

- **Answer Wizard:** Enables you to type in a question in plain English, and displays topics that should help you with your question.
- **Index:** Displays an alphabetical listing of the Help topics available to you. You can scroll through the list or type the first few letters of the topic on which you want to get help.

Tip: If you have used a previous version of Access, you might want to use the default Help menu, which provides information on the new features of Access 2000. This information is listed under the What's New topic.

The Contents Tab

The list of Help topics under the Contents tab is very general. Book icons designate general topics. Double-click a book icon to display more specific topics. You can double-click an open topic to close it. Double-clicking the general topics leads you to specific Help topics, which are indicated by open-book icons and page icons, as shown in Figure 3.4.

Figure 3.4 Viewing specific topics indicated by the book and page icons.

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The Index Tab

You can click the Index tab to search for help alphabetically. Type the first few letters of the help topic for which you are searching, and the menu jumps to the topics that start with those letters, as shown in Figure 3.5. Double-click a topic, or select the topic and click the Display button, to view the help topic.

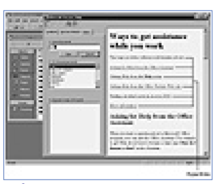

Figure 3.5 Using a shortcut to search for help

When a Help topic is displayed, some words appear underlined, as shown in Figure 3.5. If you click these words, which are called *hyperlinks*, you are taken to a new area with more information on that specific word or topic. When viewing these Help topics, you can click the Back button to return to the previous Help topic. You can click Help Topics to return to the main Help menu.

Tip: One good shortcut involves the right mouse button. Access 2000 uses the right mouse button for many different options. Right-clicking different parts of the database gives you several shortcut options for that part of the database. Experiment with the parts of the database to see what shortcuts you can use.

ToolTips

You can get help on using the toolbar tools by viewing ToolTips. When you move the mouse pointer to one of the toolbar tools and leave the mouse pointer on the tool for a moment, Access displays the name of the selected tool in a small box next to the pointer. This is a *ToolTip*, as shown in Figure 3.6.

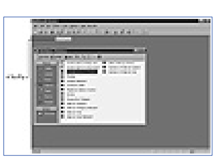

Figure 3.6 Placing your cursor over a toolbar button to preview the action that the icon performs.

Screen Tips

Screen tips are similar to ToolTips but usually provide more information. *Screen tips* give you a short explanation about the various parts of Access. They consist of text only, displayed in a rectangle. Screen tips provide a paragraph about the topic, whereas ToolTips consist only of a word or two. You use screen tips by clicking the Help icon on the toolbar or choosing Help, What's This? You then click the area of the screen that you want information on, and Access displays a screen tip consisting of a paragraph of text about the item you selected, as shown in Figure 3.7.

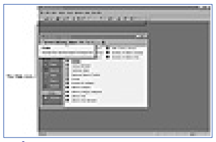

Figure 3.7 Using screen tips to learn about the Tables tab.

Tip: You also can press Shift+F1 to access screen tips related to the part of the screen where your cursor is located.

The Microsoft Office on the Web Option

You might have noticed an option on your Help menu called Office on the Web (see Figure 3.8). Clicking this menu item causes Access to log onto the Internet (if necessary) and take you to the Web page with Help related to the topic you selected.

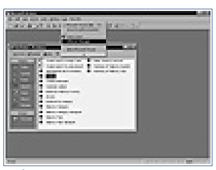

Figure 3.8 Using the Help menu to access the Internet and view Help related to a specific topic.

Summary

In this hour, I explained how to find topic information using the online Help systems. There are many different ways to get help using Access 2000. The most popular and easiest ways to get help are covered in this hour.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What other Office Assistants are available for use?**

A Access 2000 gives you six different Office Assistants: The Dot, F1 the Robot, The Genius, Office Logo, Mother Nature, and Rocky the Dog. They all perform exactly the same, but each provides a way to make your desktop unique. Microsoft will probably add more assistants. Check its Web site at http://www.microsoft.com/office.

Q **What kind of help is available on the Microsoft Web pages?**

A All kinds of help and news on Microsoft products are available on the Microsoft Web pages (http://www.microsoft.com/office). Tips, free software downloads, and more information is available.

Quiz

1. Where can you get help on the Internet?
2. How do you access Help?
3. Can you browse for Help?

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Part II
Editing Data in an Existing Database

Hour

Hour 4
Understanding Someone Else's Database

Timothy Buchanan

This hour helps you quickly understand the basic design of a database that someone else has developed and to make changes to that database as necessary. You learn about the following topics in this hour:

- Examining startup options
- Reviewing security levels
- Understanding existing relationships
- Establishing referential integrity
- Using encryption
- Using the Database Documenter

Note: Several concepts covered in this hour are too complicated to be discussed completely within the scope of this book. I will cover the basic topics related to understanding an existing database.

Viewing the Splash Screen

You might have noticed when loading the Northwind database that a splash screen appears first. This screen simply tells you a little about the database, but this feature also can be used as a security measure. Some databases use the AutoExec option or the Startup macro to display the splash screen to prevent you from accessing other parts of the database. This way you can show the user just the main menu and hide the other elements of the database. Using this method the user can still access the rest of the database, but they first have to exit the menu. You can skip this opening screen by pressing Shift while the database is loading. This prevents the AutoExec macro from executing.

Note: A macro is an Access database object that enables several menu item actions to take place at once. The Startup macro is a macro that executes automatically when the database is opened, usually running a “splash screen” and opening forms. You’ll learn about these and other types of macros in Hour 21, “Creating Macros.”

Opening a Microsoft SQL Server Database

Access 2000 is a very versatile database development application. Not only can it work with native Access database files, but it can also be used to create and modify the design of Microsoft SQL Server databases. While SQL Server database administration is beyond the scope of this book, it’s important that you at least know how to use Access 2000 to open a SQL Server database.

Access 2000 works with SQL Server databases through the use of Access Project (`ADP`) files. These files contain the information necessary for Access to connect to the SQL Server database they represent. Access 2000 provides two ways to create new ADP files: one for a new SQL Server database and one for an existing SQL Server database. Both of these options are found on the General tab of the New Database window (see Figure 4.1).

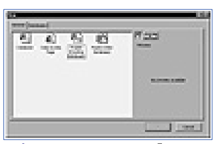

Figure 4.1 The New Database dialog box, showing the Project (Existing Database) and Project (New Database) icons.

To work with SQL Server databases, you must have the SQL Server client access modules installed on your system. Additionally, you must have the client configuration set properly for your network protocols and the particular SQL Server machine to which you’ll connect. All of this is beyond the scope of this book and should be set up by a system administrator, particularly if you’re using an enterprise-based machine. Once you have these items in place, you can proceed to create your Access Project file.

If the database already exists on the SQL Server, double-click the Project (Existing Database) entry in the New Database dialog box. If you’re creating a new database on the SQL Server machine, use the Project (New Database) entry. In either case, the File New Database dialog box appears. This is a standard File Open/New dialog box. Enter a name for your project files (which have an extension of `ADP`) and pick an appropriate folder. Then click the Create button.

If you choose the Project (Existing Database) entry, the Data Link Properties dialog box, shown in Figure 4.2, appears.

Figure 4.2 The Data Link Properties dialog box, where you enter the information necessary to connect to an existing SQL Server database.

This dialog box has three steps. You enter the name of the SQL Server machine (in step 1 of the dialog box), your login information required to gain access to the SQL Server (in step 2), and the name of the database which you're opening (in step 3). If SQL Server is version 7.0, and you've entered proper login information, you will be able to drop down the list box in step 3 and see a list of the databases to which you have access.

After the dialog box is completed, you can click the Test Connection button to validate everything. If all is well, you'll get a success message. Otherwise you'll get a message box informing you of the errant entry or possible communication problem with the SQL Server. Click the OK button to connect to the database. Access will populate the various sections of the Database window, as shown in Figure 4.3.

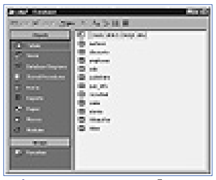

Figure 4.3 The Database window connected to a SQL Server.

If instead of an existing database, you choose the Project (New Database) entry on the New Database dialog box, Access will launch the Microsoft SQL Server Database Wizard instead of the Data Link Properties dialog box. This wizard is shown in Figure 4.4.

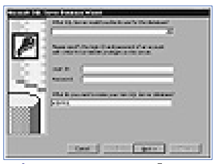

Figure 4.4 The Microsoft SQL Server Database Wizard, for creating a new SQL Server database.

Note: This wizard is not installed under the typical installation. However, Access will prompt you to install it thanks to the "Install on First Use" feature of Office 2000 Setup. You'll obviously need to install it if you wish to create SQL Server databases in this manner.

Here you enter a server name, the login information (you must have CREATE DATABASE permission on the SQL Server you specified in order to create a new database there), and a name for the new database. The wizard provides a default name that's based upon the Access Project filename you specified on the File New Database dialog box.

After the information is entered, click the Next button. Since the wizard only has two dialog boxes, this is its final dialog box. Click Finish to create the new database. After it's created, you'll find yourself at the Database window ready to add the objects (such as tables, views, and stored procedures) needed in your database.

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Looking at the Types of Security

Two general types of database security are available in Access 2000. The first and simplest is *password security*. Databases that have this type of security display a Password Required screen when you try to load the database, as shown in Figure 4.5.

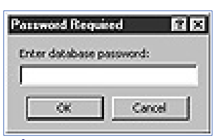

Figure 4.5 Entering your password so you can load the database.

If you do not enter the correct password, you cannot open the database. If you type the correct password, you are allowed to open the database, and you also are granted rights to view and edit all objects in the database.

Tip: If the database you tried to load displays a Password Required screen when you open it and you do not have the password, you must get the correct password from the database designer before you can log on. You will not be able to open the database until you get the password.

The second type of security is *user-level security*, and it is more flexible and extensive than simply setting a password. This form of security is similar to a network system's security. Users have to enter a user ID and password when they open databases that have security passwords enabled. These users are defined as members of a group in the workgroup information file. Each group is given permissions that regulate what they are allowed to do with each object in the database. See Hour 23, "Database Administration," for more on permissions.

Note: If you cannot access the whole database, or if it is difficult to access all parts of a database, the database you are trying to change is probably using user-level security. The easiest thing to do is to contact the original database designer and have him remove the security. If you cannot do that, you can remove user-level security, but it is beyond the scope of this book to explain how. You can find more information about this by searching for the Help topic "Removing User-Level Security."

Working with Encrypted Databases

Encrypted databases are another potential problem when working with someone else's database. Encrypted databases are databases that have been compacted and made indecipherable to a word processor or utility program. Access can still open encrypted databases. To decrypt a database, choose Tools, Security, Encrypt/Decrypt Database. Next specify the database you want to decrypt and click OK. Now specify the name, drive, and folder you want for the decrypted database, and then click OK. This process creates a new, decrypted copy of your original database. The old, encrypted, database still exists on your computer.

Note: You must have enough disk space for both the original database and the decrypted database. For example, if the database is 5MB, you need at least 10MB of hard drive space or you get an error.

Caution: Encrypting a database does not restrict access to any of the database objects. You must implement user-level security in order to restrict access.

Examining Relationships

After you can open and change the objects of the database, the next topic you need to consider is the relationships between the objects in the database. As you might remember from Hour 2, "A Quick Tour of Access 2000," *relationships* are the way objects are linked together to ensure data integrity. To view the relationships of objects, you can open the Relationships window. Make sure that the database is loaded and that the Database window is active. Press F11 if you do not know whether the Database window is active. Click the Relationships button on the toolbar or choose Tools, Relationships from the menu. If any relationships exist in this database, the Relationships window is displayed. If no relationships are defined, the Add Table/Queries dialog box appears. Figure 4.6 shows the Relationships window for the Northwind database.

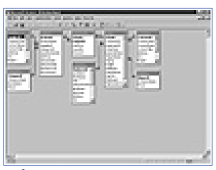

Figure 4.6 Viewing the Northwind database Relationships window.

You can use the Relationships window to see which tables and fields are related to one another. You can use this information to build a blueprint of how the database is designed. The different symbols represent the types of relationships that exist between the database objects. The 1 symbols represent the "one sides" in one-to-one or one-to-many relationships, and the infinity symbols represent the "infinity sides" in one-to-many relationships.

Relationships are important to the overall design of a database for many reasons. Relationships between objects are used to maintain referential integrity. *Referential integrity* refers to a system of rules that Access 2000 uses to ensure that relationships between records in related objects remain valid and that related data is not accidentally changed or deleted. A well-designed database uses referential integrity to ensure data validity.

Using the Database Documenter

The Database Documenter is a tool that first was included with Access 95. You can use it to easily explore the database design and objects. You can view the table design for a table in your database by choosing Tools, Analyze, Documenter, as shown in Figure 4.7. You can also print the table design after viewing it. This feature is not installed automatically when you install Access 2000. If you did not choose to install it, Access 2000 will ask you if you want to install it now.

Figure 4.7 Viewing Northwind's table design in the Database Documenter.

After you open the Database Documenter, a form appears in which you can choose which database objects you want to analyze. You can select the All Object Types tab to display a list of all the object types in the database, as well as different options for printing. You can also click the Options button to access additional options that enable you to select the information to print about your database. You can even print all the field names, their properties, and their indexes. After you select the information you want to display, Access displays this information in a report. You can then simply view this information or print it.

Note: You can use the Database Documenter Report to document all the tables, queries, forms, and other objects to tell you more about the database with which you are working. Print out a copy of this report for future reference. Figure 4.8 shows the Database Documenter report for the Northwind database.

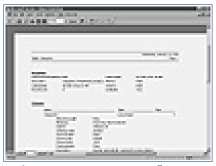

Figure 4.8 The Database Documenter Report for the Northwind database.

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Summary

This hour discussed ways to quickly learn and understand the basic design of a database that someone else has developed and to make changes to that database as necessary. Security and encryption of databases were also covered.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What can you do with a Startup macro?**

A You can use the Startup macro to open any database object such as forms, reports, queries, or tables. Any action performed by the menu can be performed in a macro.

Q **Why should you use relationships?**

A Relationships are a very important feature of any database program. Relationships ensure that your data is valid and that there is no unnecessary duplication of data.

Quiz

1. How do you skip the startup screen when a database loads?
2. How can you look at the relationships in a database?
3. Can you save the results of a database documentation?

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Hour 5
Using the Datasheet View

Craig Eddy

Access 2000 provides a variety of ways to view and work with data, whether that data resides in tables or is returned by queries. There are forms, Datasheet views, Data Access Pages, Print Preview windows, and printed reports. This hour provides an introduction to the Datasheet views, which, except for forms, you'll probably use more often than any other window in Access. This chapter covers the fundamentals of working with the Datasheet view. In future hours, you'll build on this knowledge while delving into the specifics of the hour's topic.

The highlights of this hour follow:

- An Overview of the Datasheet Windows
- Toolbars Used
- Sorting the Datasheet
- Finding and Filtering Records
- Working with Records in the Datasheet
- Data Entry Shortcuts
- Working with Subdatasheets

An Overview of the Datasheet Windows

Datasheet views are very similar to Excel spreadsheets. An example is shown in Figure 5.1. As you can see, data is displayed in a row and column format. Each row represents a single record in the table or query results. Each column represents a field in the table or returned by the query. Tables, queries, and forms all have Datasheet views available.

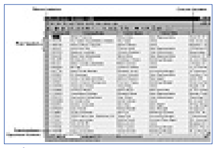


Figure 5.1 A typical Datasheet window.

Note: Not all forms have a Datasheet view. For example, the Main Switchboard form does not display any data, thus rendering a Datasheet view useless.

You can use the row and column headings for various editing functions or to sort and filter the information. Using the + sign in the first column, you can expand the subdatasheet to show records related to the selected record. Subdatasheets are described later in this chapter. You can also format the way the data is displayed within the datasheet, as well as print or export that data.

The remainder of this hour will cover the basics of working with the Datasheet views. If you want to work along with the text, open the Northwind sample database that you installed with Access 2000.

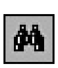
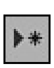
Toolbars Used

In Access 2000, as well as most other Office 2000 products, you'll make heavy use of the toolbars to perform common functions. These are the rows of buttons just below the application's main menu. They provide a way to use common features with a single click of the mouse. This section provides you with an introduction to the Datasheet toolbar, which is a collection of the more useful toolbar buttons present while a Datasheet view is active.

The Datasheet toolbar is shown in Figure 5.2. Table 5.1 follows with a brief explanation of each button. This hour I'll only be concerned with the buttons specific to datasheets, so my discussion will start with the Sort Ascending button.

Figure 5.2 The Datasheet view toolbar.

Table 5.1 The Toolbar Buttons of the Datasheet Views

Icon	Name	Description
	Sort Ascending	Sort the datasheet's records from last to first using the selected or current column to sort on.
	Sort Descending	Sort the datasheet's records from first to last using the selected or current column to sort on.
	Filter by Selection	Filter the datasheet so that only records having the same value in the selected field will remain in the datasheet. If only a portion of the field's value is selected, any records that have the same matching portion will remain.
	Filter by Form	Filters the datasheet based on data you enter into a form which is opened when you click this button. This allows you to filter on more than one field at a time.
	Apply/Remove Filter	If a filter is not active, applies the last defined filter. If a filter is active, removes the filter and returns the datasheet to its original contents.
	Find	Searches the currently selected column for a value which you specify. The matching records are found one at a time.
	New Record	If the datasheet is updatable, allows you to enter a new record into the database.
	Delete Record	If the datasheet is updatable, allows you to delete the currently selected record or records.

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Sorting the Datasheet

One of the most useful features of a database application is its capability to sort data. Access 2000, likewise, has a powerful sorting tool you can use with the click of a button.

The records displayed in the datasheet window can be sorted on a single column by simply highlighting the column and then clicking the appropriate toolbar button. You can sort the data in either ascending (first to last) or descending (last to first) order. To sort on more than one column, the columns must be adjacent to one another in the datasheet window. You must highlight each column on which you want to sort. Access will then sort the records starting with the leftmost of the selected columns.

You can sort any type of data except fields that have data types of Memo, Hyperlink, and OLE Object. The Memo and OLE Object data types do not lend themselves to efficient sorting and the Hyperlink data is really not in a format that can be sorted. Hyperlink fields contain addresses of objects which are in a variety of formats (such as http://www.mcp.com or ftp://ftp.mcp.com).

There are two toolbar buttons that are used in sorting: the Sort Ascending button and the Sort Descending button. If the column on which you want to search has the focus (that is, has the cursor in it), you can click these buttons to sort the data. You can also use the Records, Sort flyout menu and select either Sort Ascending or Sort Descending.

If you want to sort on multiple adjacent columns, simply select the columns by Shift-clicking in the column header for each column and then clicking the appropriate sort toolbar button or using the appropriate menu item.

To return the datasheet's data back to its original sort order, use the Records, Remove Filter/Sort menu item.

To try out some sorting, open the Northwind sample database that you should have installed when you installed Access 2000. Open the Customers table in Datasheet view by clicking on the Tables section in the Objects group of the Database window, selecting the Customers table, and clicking the Open button. Let's first sort on the `Contact Name` field. Select the column by clicking on the words `Contact Name` in the column header. Now click either the Sort Ascending toolbar button, or click the right mouse button and select Sort Ascending in the shortcut menu. The data is now sorted by the `Contact Name` field. Return the datasheet to its default sort order by using the Records, Remove Filter/Sort menu item. The data is now back the way it was before you sorted it.

Finding and Filtering Records

Another feature that makes databases useful is their capability to find and to filter data. Being able to find and to filter means that you can locate and work with the specific information that you're interested in at a particular time. The difference between finding and filtering in a Datasheet view is that when you perform a find, you'll locate a single record at a time. Enacting a filter, however, will find multiple records by narrowing down the data displayed in the datasheet to the records that match your filter specifications.

Finding Records

First let's look at how the find feature works. Open the Northwind database's Customers table again. Click in the `Contact Title` field's column. Click the Find button on the toolbar. The Find and Replace dialog appears, with the `Contact Title` field already selected in the Look In drop-down list (see Figure 5.3).

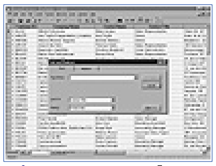

Figure 5.3 The Find and Replace dialog box.

Enter `Owner` in the Find What text box and click the Find Next button. The first record with `Owner` in the `Contact Title` field is selected. Click Find Next to locate the next record with `Owner` in the `Contact Title` field. Access indicates the found record by highlighting the Find What text and making the record in which it was found the current record (the leftmost column has a right-facing triangle in it). Keep going, clicking on the Find Next button until you've located all of them (not really, but I'm trying to make a point here, as you'll see in the next section).

Filtering by Selection

Finding records in this manner is a bit tedious. And you really can't do a whole lot with the records you do find because they're being located one at a time and as soon as you move to the next record, you've lost touch with the previous record you found. Here's where filters come to the rescue: Filters will weed out any records that do not match your criteria. The datasheet will be populated with only the records matching the filter. Let's try it.

If the Find and Replace dialog is still open, close it by clicking the Cancel button. Click in the `Contact Title` column for one of the records which has `Owner` in this column. Click the Filter by Selection toolbar button. Now the datasheet should appear as in Figure 5.4. Only the records whose `Contact Title` equals `Owner` are left in the datasheet. You can now print this datasheet or export the data to some other file. A little more useful than Find, don't you think?

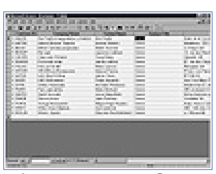

Figure 5.4 The Customers table filtered by *`Contact Title`* equals Owner.

Click the Remove Filter button to return the datasheet to its original contents. Now, click it again to see that the previous filter's criteria are still active.

Using Filter by Form

Now let's look at the Filter by Form feature. This allows you to filter across multiple fields at once. Click the Filter by Form button. The window changes to a single row grid with Customers: Filter by Form in the title bar (see Figure 5.5). Notice that in the `Contact Title` field the Owner criteria is already present. Scroll over to the Country field using the horizontal scrollbar at the bottom of this window. The drop-down list boxes are populated with the current data from all customers in the database. So, if you open the drop-down list box in the Country field, you'll see that it's filled with all the different countries represented by the customers in the database. Select `USA` in the drop-down list for Country (see Figure 5.6). Click the Apply

Filter toolbar button (it’s the same button as on the normal datasheet toolbar, just in a different location). Now the datasheet contains only two records, both of which have `Owner` in the Contact Title and `USA` in the Country.

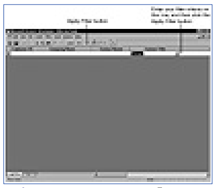

Figure 5.5 The Customers table’s Filter by Form window.

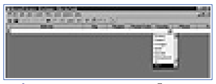

Figure 5.6 The Customers table’s Filter by Form window showing the Country selection.

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Working with Records in the Datasheet

Now that you have the data in which you are interested displayed in the datasheet, it's time to do some work with that data. This section discusses how you edit the data in a datasheet.

Most of the editing discussed in this section requires that the datasheet in question be updatable; that is, that you are allowed to update the records. Some queries that you can execute in Access 2000 produce a resulting set of data which cannot be updated. Unfortunately, Access does not always provide a visual cue that a datasheet is not updatable. If you try to type in one of the fields of a datasheet that cannot be updated, you'll hear a beep and the status bar at the bottom of the Access window will display the following message: This Recordset is not updatable.

Adding, Editing, and Deleting Records

To add records to an updatable datasheet, click the New Record toolbar button. The cursor is moved to a blank row at the bottom of the datasheet. You should now enter the data for this record. Moving to a different row or closing the datasheet window will cause Access to save your new row. You can also use the Records, Save Record menu item.

To edit data in a datasheet, simply select the record and field you want to edit by clicking in its row and column. Make your desired changes and either move to a different row or use the Records, Save Record menu item to save the changes. If you have violated a rule imposed by the database's design, Access will display a message informing you of the problem. You must either correct the data problem or cancel the edits you've made by pressing the Esc key.

To delete a record from the datasheet, click in the row for that record and click the Delete Record toolbar button. You can also use the Edit, Delete Record menu item or select the row (by clicking in its row header in the far left column), right-clicking the mouse and selecting Delete Record from the shortcut menu. Again, if there is a database rule that requires this record to be in the database, you will receive a message from Access informing you of this fact.

Copying, Cutting, and Moving Records

In some instances you might want to copy an entire record and modify only a few of the fields. First, select the record to be copied by either clicking in the record's row header or by using the Edit, Select Record menu item. Next use either the Edit, Copy menu item or right-click the mouse and select Copy from the shortcut menu. The record has now been copied to the Windows Clipboard. To add the new copy to the current datasheet, use the Edit, Paste Append menu item. To add the copy to a different datasheet (but with the same fields as the current datasheet), open that datasheet and use the Edit, Paste Append menu item.

Caution: WARNING! If you don't change *any* of the data in the pasted record before you move to another row in the datasheet, you'll more than likely cause Access to display an error message. Most tables in an Access database require that at least one field contain a value that's unique from all the other fields in the table.

In the case where you simply paste a copy of another record, you'll have no data unique from the record which you copied.

To copy a record to the Clipboard and delete it from the current datasheet, use the Edit, Cut menu item or right-click the mouse and select Cut from the shortcut menu. The record has now been deleted and copied to the Windows Clipboard. You can now use the Edit, Paste Append menu item in another datasheet to move that record to the other datasheet. Again, the fields must be identical between the two datasheets.

Data Entry Shortcuts

Table 5.2 shows a few of the available shortcut keys you can use when editing data in the datasheet.

Table 5.2 Data Entry Shortcut Keys

Action	Keystroke
Insert the current date	Ctrl+semicolon (;)
Insert the current time	Ctrl+colon (:)
Insert the default value	Ctrl+Alt+spacebar
Insert the value from the same field in the previous record	Ctrl+apostrophe (')
Add a new record	Ctrl+plus sign (+)
Delete the current record	Ctrl+minus sign (-)
Save changes	Shift+Enter
Toggle between values in a check box or option button	spacebar
Insert a new record	Ctrl+Enter

Working with Subdatasheets

There's a really cool feature hidden within most datasheets you'll encounter. Recall Figure 5.1 having the subdatasheet expander column with the plus signs? You can click on those plus to expose the subdatasheet. A subdatasheet shows records from another table or query which are related to the row whose expander you clicked. Figure 5.7 shows the Customers table and the records from the Orders table related to a certain customer.

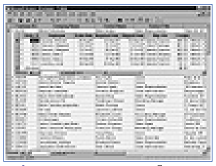

Figure 5.7 The Customers table with an expanded subdatasheet.

You can continue this "drilldown" process with the subdatasheet's records, if a subdatasheet is available. For example, Figure 5.8 shows the Customers table with a subdatasheet within a subdatasheet. The first subdatasheet shows all the orders related to the selected customer. The inner subdatasheet displays all the line items for the selected order.

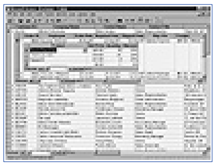

Figure 5.8 The Customers table with two levels of subdatasheets expanded.

Subdatasheets don't appear by magic. You have to define the relationships between the tables and inform Access that you want to use the subdatasheet features. This is all explained in Hour 17, "Creating Tables."

When a subdatasheet has the focus, you can perform all the same functions available in the standard datasheet window. This includes formatting and filtering.

Note: When you format a subdatasheet, the formatting information will apply to all subdatasheets at the same level as the one with focus. For example, when you expand another order record after you've set formatting information for an order details subdatasheet, the newly opened order details subdatasheet will have the same formatting.

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Formatting the Datasheet

Not only is the datasheet a handy way to view your data, it can also be a well-formatted way to do so. Access 2000 has many features that enable you to adjust the look and feel of the datasheet window. This section will touch upon a few of these features.

Changing Datasheet Formatting

By changing the datasheet formatting you can change elements such as the background color and how the cells are displayed graphically. To access these elements, use the Format, Datasheet menu item. The Datasheet Formatting dialog shown in Figure 5.9 appears.

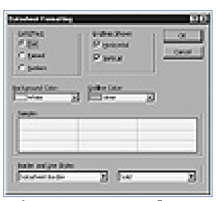

Figure 5.9 The Datasheet Formatting dialog.

On this dialog you can choose whether or not to display the horizontal and vertical gridlines, what color and line style to use for the gridlines and the cell background, and whether to make the cells appear flat, raised, or sunken. To change the line style for a specific type of line (such as the datasheet border, horizontal grid lines, or vertical gridlines), select the appropriate entry in the left-hand drop-down list box of the Border and Line Styles frame. The Sample frame of this dialog shows how the datasheet will look if you click the OK button.

Changing Datasheet Font

You can also change the font used for all text displayed in the datasheet. Use the Format, Font menu item to access the Font dialog shown in Figure 5.10.

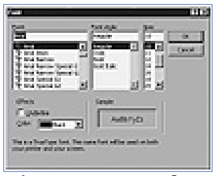

Figure 5.10 The Font dialog.

Here again there is a Sample frame that displays the results of your font changes.

Changing Column Width and Row Height

You can also change the width of individual columns and the height of all rows in the datasheet. To resize a column or row, move the cursor to the line in the column or row header that separates the columns and rows. When it's in the proper position, the cursor will change from a pointer to a sizing cursor. For the column header, this cursor is a vertical line with arrows pointing left and right (see Figure 5.11). For the row header, this cursor is a horizontal line with arrows pointing up and down. You can drag this cursor in the desired direction to either expand or contract the row or column sizing.

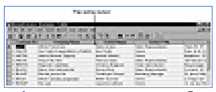

Figure 5.11 Column resizing in action.

In addition to this method, you can also double-click the mouse when the sizing cursor is active. This will cause the row or column to be sized to fit the data currently displayed in the datasheet. Also, you can use the Format, Column Width and Format, Row Height menu items to display dialog boxes.

Note: Access will print the datasheet using the column widths and row heights the same size as they are on the datasheet window.

To move a column to a different place in the datasheet, simply click the column header, hold the mouse button down, and drag the column to its new location.

Printing the Datasheet

Now that you've seen a basic introduction to using the Datasheet views, it's time to learn how to print the data. Printing in Access 2000 is about the easiest operation you'll perform (next to closing a window, which I'll touch on in the next section), so this won't take long.

After you have your datasheet loaded with the data you'd like to print, use the File, Page Setup menu item to set the output page's margins, paper orientation, and paper size.

Next, use the File, Print Preview menu item to display the output in the print preview window. This gives you a chance to see just how the printout will look and to make any adjustments if necessary. If everything is in order, click the toolbar's Print button and the datasheet will be output to your default printer.

To print using a dialog to choose the printer, select the print range, or set the number of copies to be printed, use the File, Print menu item. The Print dialog box appears where you can set these properties to meet your current needs.

Closing the Datasheet

When you've finished working with the datasheet, you need to close the window. Click the close button in the upper-right corner of the window. You can also use the File, Close menu item.

If you have modified any of the formatting for the datasheet, such as the column widths, font, and so on, Access will prompt you asking whether you want to save these format changes. If you select Yes, then the next time you open that datasheet it will look just like it does now. If you don't care to save the formatting changes you've made, select No.

Summary

This hour has introduced you to the basics of working with the Datasheet views. It's a pretty important topic because throughout the rest of this venture in learning Access 2000 you'll be using datasheets quite a few times.

The next hour teaches you how to work with existing tables in a database. Here you'll rely heavily on datasheets to get through the hour. If you need to, review the material in this hour and perhaps work through the examples with a different datasheet than the one I used.

Workshop

This section contains a questions and answers section as well as a Quiz to test your knowledge of queries. The Quiz answers are contained in Appendix A, "Quiz Answers."

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Q&A

Q **What causes Access to display a message box about not being able to delete a record when I attempt to do so?**

A Because Access is a relational database, it is possible to relate rows in one table to rows in another table. This relationship is usually based on a key field in common between the tables. In order to maintain your data's integrity, it is necessary to maintain this related data throughout the database. Otherwise, you will produce orphan records which are records in one table that point to a record in another table that no longer exists. For example, if you were to delete a customer's record, but there were still order records which "pointed" to that customer, those order records would be orphans: their corresponding customer record would no longer exist, and you wouldn't know anything about who had placed that order!

If you're working in a workgroup environment, there's another possibility: You do not have sufficient permission on the table you're attempting to delete from. Every user of an Access database has a particular set of security permissions on every object in the database. If your database has not been secured in any way, the default permissions apply and you should be able to delete records. If the database has been secured, it might be that you do not have permission to perform deletions. If this is the case, see your system administrator about changing your permissions. In Hour 23, "Database Administration," you'll find more information about database security.

Q **Can I change the font of an individual cell in the datasheet?**

A No. Font changes apply to the entire datasheet.

Quiz

1. Which is more useful when you want to print a specific set of records in a datasheet: Find or Filter?
2. Can you sort the datasheet based on more than one column?
3. What differences are there between subdatasheets and standard datasheets?

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Hour 6
Using an Existing Table

Craig Eddy

Tables are the basic building blocks of any database. Tables serve as the repository where information such as names, addresses, product cost, and so on, is actually stored. A true database without some sort of table does not really serve much of a purpose (recall that creating an Access Project file does not really constitute creating a database, so the fact that the project file contains no tables doesn’t violate this rule).

I’ve found that the best way to learn how to design and implement databases is to examine existing databases, particularly the table design. This is even more helpful when the database being examined performs a function similar to your current needs.

As you saw in the last hour, you can use the Datasheet view to view and edit the data held in a table. In this hour, you’ll learn the basics of working with tables that already exist in a database, and you’ll learn the basics of a table’s structure. The highlights of this hour include the following:

- Opening tables
- Using the Design and Datasheet views
- Looking at the basic structure of tables

Opening Tables

When working with an existing database, the place to start is usually with the tables in the database. Tables contain the data being stored in the database. Access’s integrated store and SQL Server databases use a *relational database model*—the database can contain more than one table, and the tables in the database can be related to one another.

To open an existing table, activate the Access 2000 Database window. Make sure the Objects group is exposed. Next click the Tables section. The List view for the Tables section lists the three available table wizards and then displays the names of all the existing tables in the open database. Figure 6.1 shows the

Tables section for the Northwind sample database that ships with Access 2000.

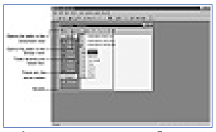

Figure 6.1 The Tables section for the Northwind sample database.

Click the name of the table you want to work with. After you select a table, you can perform many different actions on it. You can use the buttons at the top of the Database window to open the table in Datasheet view or Design view. To open the table in Datasheet view, click the Open button. For Design view, click the Design button.

You can right-click a table name to see a larger list of available activities useful for existing tables. Right-clicking causes a pop-up menu to appear. In addition to Open and Design, which perform the same functions as the buttons on the Tables tab, this menu contains items such as:

- **Print and Print Preview:** Enable you to print the data in the table. The printout will have the same look as if you had printed the table with the Datasheet View window.
- **Cut and Copy:** Enable you to use the Windows clipboard to cut and paste or copy and paste an entire table—data and all. You can paste a copied or cut table into the currently open database, or into a completely different database.
- **Save As:** Allows you to save the table’s data and the definition to a new table, or to a form, report, or data access page.
- **Export**: Allows you to export the table’s definition and data to an external Access file. You can also export to a different type of file, such as an HTML file or a Microsoft Excel spreadsheet file.
- **Send To:** A flyout menu which provides a mechanism for emailing the table to someone else.
- **Add to Group:** A flyout menu which enables you to organize the objects in the database into groups, providing a more logical way to locate the objects. For example, you might have a group labeled System Tables and one labeled User Tables. The former would contains tables describing the database, the later containing user-entered data.
- **Create Shortcut:** Enables you to create a Windows shortcut to the selected table. You can place the shortcut on your desktop or in any location you specify.
- **Delete:** Enables you to, surprisingly, delete the table as well as any data it contains. Access warns you if the table is involved in any relationships with other tables. You then can instruct Access to remove these relationships and delete the table.
- **Rename:** Enables you to rename the table. You also can rename a table by clicking its name after selecting it.
- **Properties:** Displays the properties of the current table. You also can view the table properties by clicking the Details button on the Database window or choosing View, Details from the main menu. Figure 6.2 shows the Details view for the Tables tab.

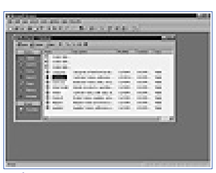

Figure 6.2 Using the Tables tab in Details view.

You also can perform all these functions by using Access 2000’s main menu. You can create a Windows shortcut by choosing Edit, Create Shortcut, for example.

Using the Design and Datasheet Views

In this section, you’ll see how easy it is to view the design and data of existing tables. Make sure that you have the Northwind database open so that you can follow along with the text. Also, activate the Database window by clicking its title bar (if visible), clicking the Microsoft Access button on the Windows Task Bar, or choosing Window, 1 Northwind: Database from the main menu.

In this section, you’ll examine the Employees table, so click Employees in the Table list.

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Design View

After you select the Employees table, right-click and choose Design or simply click the Design button. This opens the Design view for the Employees table, as shown in Figure 6.3.

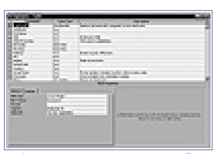

Figure 6.3 Looking at the Employees table in Design view.

You can use Design view to examine the structure of the table—the fields contained in the table, as well as the data types and properties of those fields. This topic is examined further in “Examining the Basic Structure of Tables,” later in this hour.

Design view is set up in a form/subform arrangement. The grid at the top of the Design View window lists all the fields in the table, their data types, and an optional description for the field. The tabs at the bottom of the form display other properties for the field that is selected in the grid.

To view the details of another field, simply click anywhere in the grid row on which it appears. The information displayed in the tabs changes to match the properties for the newly selected field. The leftmost column of the grid at the top of the Design View window displays an arrow on the row of the currently selected field.

If the leftmost column of the grid displays a key icon, that field is being used in the primary key for the table. The relational database model requires that every table have a field or fields that can be used to uniquely identify each record stored in the table. This field, or set of fields, is known as the *primary key* for the table.

The tabs at the bottom are divided into General and Lookup. The General tab contains miscellaneous properties for a field. The Lookup tab is used to determine whether the field is related to another table in the database. If it is, the information on the Lookup tab describes how the field’s data is entered whenever the field is displayed on a form or in Datasheet view. Select the TitleOfCourtesy column and click the Lookup tab to see how this process works. Notice the contents of the `Row Source` property. Now click on the Datasheet View toolbar button and click in the Title of Courtesy column. A drop-down arrow appears in the cell. Click the drop-down arrow and the list of combo box elements that you saw in the `Row Source` property of the Design view (see Figure 6.4).

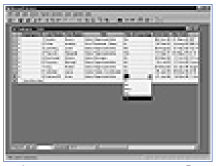

Figure 6.4 Looking at the effect of the `Row Source` property in in Datasheet view.

When you click anywhere in the Design View window, the text at the bottom right of the window changes to describe the currently selected item. Click in the Description column, for example, and the text changes to describe how the Description column is used. For additional information about any item, you can press F1 for context-sensitive help.

You'll visit the table Design View window in more depth in Hour 10, "Modifying an Existing Table."

Datasheet View

Next, you'll look at the Datasheet view. Datasheet views were covered in depth in Hour 5, but I'll review the specifics of the table Datasheet view here.

If you've been following along through this hour and still are looking at the Employees table in Design view, simply choose View, Datasheet View to open the Datasheet view. Otherwise, activate the Database window, select the Objects group, click the Tables section, and then click Employees in the list view. Next click the Open button. You also can double-click the table name and open the table in Datasheet view. Figure 6.5 shows the Datasheet view for the Employees table.

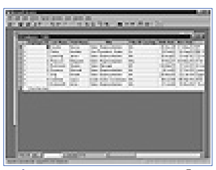

Figure 6.5 Looking at the Employees table in Datasheet view.

Datasheet view displays the data using a grid or spreadsheet format. The columns represent the fields in the table. The rows are the data records stored in the table. In the Employees table, each row represents an employee.

To move around the datasheet, you can use the mouse or the keyboard. Using the mouse, you can click in any cell in the datasheet. Using the keyboard, you can press Tab and Shift+Tab to move from field to field. When you reach the last field in the current row and press Tab again, you are taken to the first field of the next record. The same applies to the first field; if you press Shift+Tab when the cursor is in the first field, you move to the last field of the preceding record. You also can use the arrow keys to move up and down in a column; this moves you from record to record within the same field.

To add text to a highlighted field, press F2. Alternatively, you can click on the field you want to edit. To highlight the entire contents of the field, press F2 again. Pressing F2 toggles between Edit and Highlight mode.

Caution: If you do not press F2 or you don't click in the field before typing, you will replace the previous data in the field. To undo this, press the Esc key.

To select an entire record, click the leftmost column of that record's row (the column with the arrow that signifies the current row). You then can cut, copy, or delete an entire record of data.

To add a new employee to the table, click in the last row of the datasheet and enter the appropriate data. You also can append a new row by copying a row and choosing Edit, Paste Append.

You should look at a few special fields in the Employees table. First, click in the Title Of Courtesy column. Notice that the edit box changes to a drop-down list box. Click the button with the down arrow to display the available titles in the drop-down list. Click one of the titles, and the field's value changes to the value you selected. Likewise, the Reports To column displays a drop-down list. The names in this list are actually the names contained in the Employees table. You can see how this is set up by returning to Design view (choose

View, Design View), selecting the `ReportsTo` field, and clicking on the Lookup tab at the bottom of the Design View window.

Another special field is the `Photo` field. Notice that for every record in the table, the value is `Bitmap Image`. This signifies that an image object is being stored in the field. Access 2000 can store binary data and OLE objects in fields in the database. To view the image while in Datasheet view, double-click the cell for the employee whose photo you want to view. Microsoft Paint (or possibly another application that has been installed to handle bitmap files) opens, and the photo is displayed.

Click the plus sign in the first column. This will display the subdatasheet for the Employees table. By default, the Employees table's subdatasheet shows related records from the Orders table. Which related table is shown is controlled by the `Subdatasheet Name` table property (you can modify this by returning to Design View an clicking the Properties toolbar button). You work in the subdatasheet just like you work in the main datasheet.

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Examining the Basic Structure of Tables

In this section, you'll learn all about how a table is constructed. As I said earlier, the best way to learn about database design is by studying existing databases. Here, you'll examine the design of the Employees table in more detail.

If you've been following along with the text, you'll be looking at the Employees table in Datasheet view. If so, choose View, Design View to return to Design view. If you haven't been following along, open the Employees table in Design view by activating the Database window, selecting the Objects group, clicking the Tables section, selecting the Employees table, and clicking the Design button.

Field Names

The Field Name column specifies a name for the field (surprised?). The name can be practically anything you want it to be, but you can't use the same name twice in the same table. The field name is set in the leftmost column of text in the grid at the top of the Design View window. In the Employees table, some of the field names are `EmployeeID`, `LastName`, `FirstName`, `HireDate`, and `ReportsTo`.

Field names must follow certain rules. They can contain up to 64 characters and can include any combination of letters, numbers, spaces, and special characters except periods, exclamation marks, accent graves, or square brackets. Field names cannot start with spaces or control characters (ASCII values 0 to 31).

Note: Although spaces can appear in a field's name, it's not advisable to use them. Doing so necessitates the use of square brackets ([]) around the field's name whenever the field is referred to in a query or another expression. Instead of spaces, most database designers use mixed case, as in the `LastName` and `HireDate` fields in the Employees table.

Data Types

The Data Type column, which is next to the Field Name column, specifies the type of information stored in the field. The edit box for this column is a drop-down list box. The list contains all the available data types, as well as a Lookup Wizard entry. The available data types include the following:

- `Text`: A string of characters used to store alphanumeric data. The maximum number of characters you can store in a single `Text` field is 255.

- `Memo`: Stores long text fields. No maximum is specified by the user, but Access imposes a limit of 64,000 characters. The `Notes` field is a `Memo` field.
- `Number`: Stores numeric data.
- `Date/Time`: Stores dates and times. `HireDate` and `BirthDate` are Date/Time fields.
- `Currency`: A special numeric data type used for monetary values because it prevents round-off errors during calculations.
- `AutoNumber`: A special numeric data type that can be used for primary key fields. Fields of this data type always are read-only, because Access automatically inserts the next number in the sequence or a random number when a data record is created. The `EmployeeID` field is an `AutoNumber` field.
- `Yes/No`: Stores Boolean data, which can contain only one of two values, such as `On/Off`, `Yes/No`, or `True/False`.
- `OLE Object`: A special type of object or component provided by a Windows OLE server. The `Photo` field is an OLE Object type.
- `Hyperlink`: Stores the text for a hyperlink address. Access enables you to store addresses to Web documents, network files, and local files. The hyperlink also can contain more detailed information, such as a bookmark in a Word document, an object in an Access database, or a range of cells in an Excel spreadsheet. After a Hyperlink field is clicked, Access attempts to load the referenced file or document using the appropriate viewer.

As you can see, there's a data type for just about every occasion. By examining the Employees table, you can get a good feel for which data types are appropriate for your needs.

The *Lookup Wizard* is a wizard that guides you through the steps necessary to populate the Lookup tab. You'll find Lookup Wizard as the last entry in the Data Type drop-down list. To invoke the Lookup Wizard for a field, select it in the Data Type drop-down list. You will never see a field with the data type set to Lookup Wizard, even if the wizard was used to help populate a field's Lookup tab properties.

Description

A short description about the field can be entered in the Description column. The description should provide future viewers of a table's design (such as yourself) with a complete explanation of the purpose the field serves.

Note: If the field is added to an Access form, Access uses the text in the Description column as the default text displayed in the form's status bar area when the user is editing that field (unless you change the `Status Bar Text` property of the form control).

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Properties

Each field in a table has its own set of properties that further define the field and how it's used in the database. Although an exhaustive look at the different properties is not necessary at this time (field properties are covered in more detail in Hours 10, "Modifying an Existing Table," and 17, "Creating Tables"), a brief look at a few important properties is in order.

The available properties change, depending on which data type is chosen for a field. To verify this, make sure that the General tab at the bottom of the Design View window is active and select fields with different data types in the grid at the top of the Design View window. You'll see the Properties list at the bottom of the window change.

Now take a look at some of the more useful properties.

Field Size

The `Field Size` property is available for the `Text` and `Number` data types. For `Text` fields, the property specifies the maximum number of characters that can be stored in the field for a single record. Access only uses enough disk space to store the data actually entered in the field—not the amount of space required to hold the number of characters specified by the `Field Size` property. For `Number` fields, `Field Size` specifies the type of number that will be stored in the field. The available choices are

- `Byte`: a number from 0 to 255, whole numbers only
- `Integer`: –32,768 to 32,767, whole numbers only
- `Long Integer`: –2,147,483,648 to 2,147,483,647, whole numbers only
- `Single`: can store a very large number and fractional numbers
- `Double`: stores numbers larger than `Single`
- `Replication ID`
- `Decimal`

The choice made in this case does impact the amount of disk space Access uses to store the field, so `Field Size` should be appropriate to the data being stored. The most common choices you'll see are `Integer`, `Long Integer`, and `Double`. `Long Integer` fields can store numbers larger than `Integer`. `Double` fields can store data with numbers to the right of the decimal point.

Caption

The `Caption` property specifies a string to be displayed as the column heading whenever the field is displayed in Datasheet view. Also, if the field is added to a form, this value is used as the caption for the label that is added along with the field. In the Employees table, the `Caption` property is used to put spaces into the Datasheet view column headers for field names that use mixed case, such as `LastName` and `FirstName`. You can use the `Caption` property to enter any text that appropriately labels the field.

Default Value

The `Default Value` property specifies a value that will be inserted into the field if one is not specified when a record is added to the table. None of the fields in the Employees table specifies a value for the `Default` property.

Validation Rule and Validation Text

The `Validation Rule` property specifies a test to be performed on any data entered into the field. If the data does not pass the rule, a message box that displays the text specified in the `Validation Text` property appears.

In the Employees table, the `BirthDate` field specifies a `Validation Rule` property of `<Date()`. This forces any dates entered into this field to be less than the current date.

Required

The `Required` property specifies whether the field is required to have a value entered in it. If this property is set to `Yes` and you attempt to change the field to be empty, Access displays a message informing you that a value is required in the field. The `LastName` and `FirstName` fields are both required in the Employees table.

Examining Table Properties

Tables have properties in and of themselves. A table’s properties can be examined by right-clicking the table’s name in the Database window and selecting the Properties item from the shortcut menu. Figure 6.6 shows the properties for the Employees table.

Figure 6.6 Looking at the properties of the Employees table.

This dialog shows the table’s description, the dates that the table was created and last modified, and who the owner of the table is. There are also several attributes for the table. The Hidden attribute specifies that the table should not be generally visible in the Database window. (To view tables that are marked as hidden, check the Hidden objects option on the View tab of the Options dialog.) The Replicable option specifies that the table should be included in the replication process. And finally, the Row Level Tracking option specifies how replication conflicts are triggered for this table (for more information on database replication, see *Microsoft Access 2000 Unleashed* also published by Sams Publishing).

Summary

In this hour, you took a somewhat detailed look at the Employees table. You saw how to view and modify data in the table, as well as how to determine the structure of the table. Some of the concepts learned here will be greatly expanded on in upcoming hours. For now, make sure that you understand how to work with the table Design view to access the properties of the fields. Also, make sure that you know how to add and edit data in the Datasheet view. You will use both these skills heavily during the remainder of this book.

In the next hour, you'll learn how to work with existing database query definitions. They're essentially dynamically created tables and, like tables, they have both a Design view and a Datasheet view.

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Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **Why is the column heading in Datasheet view different from the field name shown in the Design view for a table?**

A Every field, regardless of data type, has a `Label` property. You use this property to specify the default caption for the field. This caption is used in the Datasheet view. It also is the default caption for the label that is placed on a form when the field is added to the form.

Q **When I add a new employee, I get a message informing me that the `FirstName` field cannot contain a `Null` value. Why is this happening?**

A Most fields have a property called `Required`. If this property is set to `Yes`, you must enter a value for every record stored in the database. If the data is really not required, you can set this property to `No`.

Q **When I attempt to delete an employee, I get a message informing me that the record cannot be deleted. Why is this happening?**

A Remember that the back-end databases you can use with Access use a relational database model. This means that you can relate a record in one table to a record or records in another table. After you create such a relationship, the information pertaining to the relationship must be kept intact. In the Northwind database, for example, you can create an Orders record that has an employee related to it—the employee who took the order, perhaps. If you then deleted that Employee record, you'd leave some incomplete data in the Orders table (you'd have orders with data pointing to invalid employees). Access 97 enforces this data integrity by disallowing deletions in this instance. As you'll see in Hour 10, however, Access 97 can instead be instructed to delete any records related to the record you're attempting to delete.

Quiz

1. How can you determine which fields make up the primary key for a table?

2. Which field property enables you to control what data can be entered into a field?
3. Can a field name contain spaces?
4. Are you stuck with the subdatasheet that Access uses as a default for a table?

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Hour 7
Using Existing Queries

Craig Eddy

In the last hour, you learned how to work with existing tables in a database. In this hour, you'll learn how to use existing queries. A query in Access 2000 produces results similar to a table, in that you can view data that has been stored in the database to which Access is connected. Unlike a table, however, queries can display data that is stored in multiple places in the current database or even outside the current database. With a query, you can specify which fields from different tables are displayed. More important, you can control what data is displayed by specifying the criteria that individual data records must match in order to be included in the query's result set.

NEW TERM A *query* is an object in an Access database that returns records from or performs actions on one or more tables in the database.

The highlights of this hour follow:

- Opening queries
- Using Datasheet view
- Using Design view
- Looking at the basic structure of queries
- Using toolbars

Note: If you're connected to a SQL Server database you won't be working with queries. You'll be working with views. Queries and views are, for all intents and purposes, identical. Wherever you see the term query in this hour, you can replace it with view.

Opening Queries

Opening an existing query is similar to opening an existing table. The first step is to open the database in question and move to the Database window’s Queries section (or Views section if you’re working against a SQL Server database). Figure 7.1 shows the Queries section for the Northwind sample database.

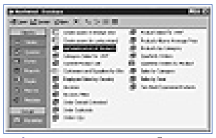

Figure 7.1 The Queries section for the Northwind database.

In Figure 7.1, you see several types of queries that are in the database. The types are denoted by different icons next to the query name in the list. To help decipher which icon goes with which query, you can switch the Queries list view to Details view by clicking the Details button on the Database window or by choosing View, Details from the main menu. The Queries list now appears as shown in Figure 7.2. The Details view works like the files pane in Windows Explorer. You can size the columns by moving the pointer between the column headers and, when the pointer changes to the sizing cursor, clicking and dragging the pointer to size the column. You can also sort the list using a column by simply clicking the column heading.

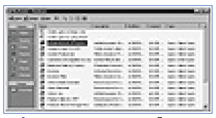

Figure 7.2 The Queries list in Details view.

The Type column is the last column that appears in Details view, as you can see in Figure 7.2. During this hour, you will learn about the following common types of queries:

- **Select queries:** These are the most common queries. By using a simple select query, you can retrieve data from many tables based on criteria specified in the query’s definition. The Category Sales for 1997 query is an example of a simple select query.
- **Crosstab queries:** These queries are a special type of select query and are similar to the pivot tables used in Microsoft Excel. You can view data summarized over different categories. For example, the Quarterly Orders by Product query in the Northwind database provides a quarterly summary of product sales for each product in the database. This query provides the sales in each quarter for each product.

New Term A *crosstab query* has row headings as well as column headings. Crosstab queries typically summarize data that is grouped by a specific category or date range.

- **Top *n* queries:** These are another type of special select query. Top *n* queries are designed to return only a certain number of the top records. The Ten Most Expensive Products query returns the names and unit prices of the 10 most expensive products in the database, for example. By reversing the sort order of the query, you also can view the 10 least expensive products. You’ll learn more about Top *n* queries in Hour 11, “Modifying and Using Existing Queries.”
- **Union queries**: These queries combine corresponding fields from multiple tables into a single field returned by the query. The same number of fields must be returned from each table involved in the union. You might create a union query to return the `CompanyName` fields from both the Customers and Suppliers table in the Northwind database, for example.

Note: Notice in Figure 7.2 that the Description column for some of the queries in the Northwind database starts with a short description of the type of query in parentheses. This is not a requirement, and it is not automatically placed there by Access. The designer of these queries thought it would be a good idea to help better explain each query’s purpose. This is a practice I highly recommend.

Like the Tables section discussed in Hour 6, the Queries list offers an Open button and a Design button. Clicking Open opens the selected query in Datasheet view. Clicking Design opens the query in Design view.

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A shortcut menu appears after you select a query and right-click. This menu contains the options Open and Design, which perform the same functions as the buttons; it also contains the other options listed in Table 7.1.

Table 7.1 Options on the Query Shortcut Menu

Option	Function
Open	Opens the selected query in Datasheet view.
Design	Opens the query in Design view.
Print	Prints the data returned by the query.
Print Preview	Displays the query results in the Print Preview window. The contents of this Preview window are identical to what will appear in an actual printout.
Cut	Cuts the query's definition and pastes it to the Windows Clipboard. You can then paste the query into the currently open database or into a completely different database.
Copy	Copies the query's definition and pastes it to the Windows Clipboard. You can then paste the query into the currently open database or into a completely different database.
Save As…	Allows you to save the query's data and the definition to a new query, or to a form, report, or data access page.
Export…	Allows you to export the query's results to an external file. You can save the query results in any number of formats. Not all formats are installed by default, so be sure to select the ones that interest you when you install Access. The more popular formats are text files or Excel files.
Send To	Flyout menu allowing you to email the selected query's results using one of several available formats (such as HTML or text).
Add To Group	Flyout menu which you can use to organize the objects in the database into logical groups.
Create Shortcut	Creates a Windows shortcut to the selected query. You can place the shortcut on your desktop or in any location you specify when you create the shortcut.
Delete	Deletes the query.

Rename	Renames the query. You also can rename a query by clicking its name once after you select it.
Properties	Displays the properties of the current query. You also can view some of the query properties by choosing View, Details.

You also can perform all these functions by using Access 2000's main menu. You can delete a query by selecting a query on the Queries tab and then choosing Edit, Delete, for example.

The following two sections discuss how to use a query after you open it—whether in Datasheet view or Design view.

Using Queries in Datasheet View

Opening a query in Datasheet view produces a display very similar to that produced when you open a table in Datasheet view. To open a query in Datasheet view, select the query on the Queries list and then click Open. Figure 7.3 shows the datasheet for the Category Sales for 1997 query.

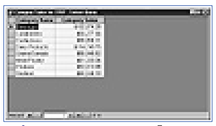

Figure 7.3 The Datasheet view of the Category Sales for 1997 query.

As you can see, the datasheet has columns representing the fields in the query and rows representing the records returned by the query. The unique aspect of this query is that the Category Sales column is not a field in the database. Instead, the query has created a sum of all the sales for each product category. This sum is displayed in the Category Sales column. That's the power of queries: You can select specific records and perform summations (totals, averages, minimums, maximums, and so on) on the data in those records.

Because of the nature of the data returned in this query, you cannot perform any updates, inserts, or deletions on the rows in the datasheet. This data is merely a summary of a lot of underlying data from other tables in the database. If you modify the Category Sales column, what underlying data should be modified—the product sale on January 12 or the one on March 7? Because Access can't determine the answer to that question, it doesn't enable you to update the data in this type of query.

> **Note:** Crosstab queries and queries with certain types of joins will not be updatable either. Be on the alert for these. Basically, any time Access cannot determine exactly which field from which specific records will be updated, the query will not be updatable.

If you open the Products Above Average Price query shown in Figure 7.4, however, you can modify the data in either column. That's because this is a simple select query with no summations in the returned data columns. It doesn't show all the products—only the ones that have an above-average price. You then can modify the data of some of the products to bring them in line with the average-priced products.

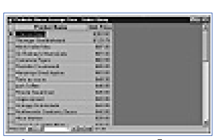

Figure 7.4 The Datasheet view of the Products Above Average Price query.

You can use the Records, Sort fly-out menu to sort the records in the datasheet. To see the lowest priced products first, for example, choose Records, Sort, Sort Ascending.

You also can create a filter to apply to the query's data. Choose Records, Filter to create a filter. The current query doesn't have much to filter on, however.

Using Queries in Design View

Queries, like tables, also have a Design View window. This is where you can view how the query is defined, as well as the properties of the columns returned by the query. Queries actually have two design views: the Design Grid (labeled as Design View on the menus and toolbar), which allows you to use *Query by Example* (QBE), and the SQL View. In this section, you'll learn how to open a query in Design View and how to work with queries in the Design Grid and in SQL View.

NEW TERM *SQL* is an acronym for Structured Query Language, which is used to define a query with words. Like other computer languages, SQL has a specific format and keywords. SQL is a common query language used by nearly all relational database platforms. The QBE Design view is actually just a graphical way to represent the SQL code that underlies all Access queries.

Whether both design views are available for a query depends on what the query does and how it is defined. A union query, for example, only has an SQL view because it is actually a combination of two or more SQL `Select` statements.

To open the Design view of a query, go to the Database window and click on the Queries button at the left. Select the query you want to open in Design view and click the Design button at the top of the database window.

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The Design Grid and Field List

The Design Grid is the Design view you see when you open most queries in Design view. Figure 7.5 shows the Design Grid for the Current Product List query.

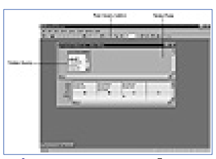

Figure 7.5 The Design Grid for the Current Product List query.

The top of the Design Grid window is referred to as the *table pane* because it displays the *Field List* for each of the tables or other queries involved in the current query. For the Current Product List query, only the Product List table is shown.

New Term The *Field List* is a listbox containing the names of all the fields contained in a table or returned by a query.

The grid at the bottom of the window is the actual QBE Design Grid. This is where you select the fields to be returned by the query, set the sort order, and specify any criteria which will be used to determine which records are returned.

SQL View

Using the SQL view is an advanced way of examining the query. This view provides you with the actual SQL code that will be executed when the query runs. To open the SQL view, either click the View dropdown button on the toolbar (it’s the one to the far left) and select SQL View, or click the View menu and select SQL View. Figure 7.6 shows the SQL view for the Current Product List query. The information provided by this view says exactly what is represented in the QBE Grid Design view, but in the language that Access 2000 uses to execute the query.

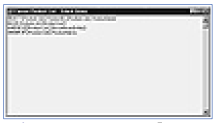

Figure 7.6 The SQL Design view for the Current Product List query.

Looking at the Basic Structure of Queries

The previous section showed you how to use the two different query design view windows. In this section, you'll learn how a query is constructed. This section concentrates on the QBE Design Grid View window. You'll learn all about fields, how the sorting is specified, how the record criteria is determined, and how to view the properties for the query and its fields. You'll be using the Current Product List query shown in Figure 7.5 as the sample query demonstrating these features.

Fields

Every select query returns at least one field. The fields that appear in the grid at the bottom of the Design Grid window are the fields that will be displayed when the query is executed or that will be used in the sorting or criteria settings for the query. (Refer to Figure 7.5.)

Action queries do not return fields, but their fields are shown in the Design Grid. The fields that appear in an action query's Design Grid are the fields that are being acted upon by the query or that are used in the sorting or criteria settings for the query.

New Term An *action query* modifies many records in a single execution. Action queries are used to update, insert, and delete records, or to populate a new table from data in existing tables.

In the Design Grid, the Show check box determines whether the field is displayed in the query's datasheet. In the Current Product List query, the `Discontinued` field is not shown in the Datasheet view; only the `ProductID` and `ProductName` fields appear.

Sorting

Let's say you wanted to present the results of a query in a specific order. The Current Product List query, for example, is sorted by the `ProductName` field. Access 2000 provides a Sort row in the Design Grid view that you use to specify the sorting for a query. The information in the Sort row determines the order in which records appear in the datasheet or in any reports or forms that use the query as their source of data.

You can set the sort order to Ascending (from A to Z, for example), Descending (from Z to A), or Not Sorted. You also can use the sort order on numeric data returned by the query. If a Numeric field is sorted in ascending order, the smallest values appear first. In descending order, the largest numbers appear first.

Criteria

Each field that appears in the Design Grid can be used to determine which records are returned by the query. Only records with data matching the specified criteria are returned by the query when it's executed or used in a form or report.

For the Current Product List query, the third column specifies that the query should return only rows from the Product List table that have their `Discontinued` field set to `No`.

For each field, you can specify criteria by using the rows below the first criteria row. These extra criteria values are used in an OR fashion with the other criteria specified for this field. This means that records are returned when the values in the field match any of the rows in the Criteria area.

If the Criteria rows are used for multiple fields, the criteria information is combined in an `AND` fashion. This means that the data must meet all the criteria entries in order to be included in the resulting set of data. For example, you might want to view the Current Product List but only see the products which are in stock. In this case, you'd add the `UnitsInStock` field to the query and enter `>0` in the Criteria row (see Figure 7.7).

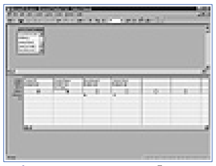

Figure 7.7 The Current Product List query with additional criteria.

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Query Properties

Like every other object in an Access database, queries have properties. To view the properties specific to the query as a whole, click in the blank area of the Design View's table pane. Then choose View, Properties or right-click and choose Properties from the shortcut menu that appears. Figure 7.8 shows the Query Properties window. In this hour, you'll review some of the properties. You'll get a more in-depth analysis in Hour 11 and in Hour 18, "Creating Queries."

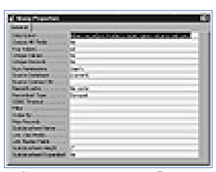

Figure 7.8 The Query Properties window for the Current Product List query.

The Query Properties window can be resized, so if some of the property settings are cut off (such as the `Description` property), you can resize the window and see more of the information.

The `Description` property is a string that describes the query. This is the same description you see on the Database window's Queries list when in Details view or after you choose Properties from the shortcut menu.

The `Output All Fields` property specifies whether all fields in the grid are shown in the query's datasheet. Setting this property to `Yes` is identical to enabling the Show check box for each field in the grid.

The `Unique Values` and `Unique Records` properties are used to remove duplicate field values or duplicate records from the query's resulting data.

The `Filter` property shows any filter that was created when the query was being viewed in Datasheet view. The `Order By` property is similar; it shows any sorting information used when the query was viewed in Datasheet view.

Field Properties

Just like tables, fields shown in queries also have individual properties. Properties affect how the field appears in the datasheet view. Fields that are used in the query but are not shown in the result set (that is, they don't have the Show box checked) do not have properties that can be set.

Fields inherit their properties from the table in which they reside. This means that after a property is set in the table's design, the value of the property is used whenever the field appears in a query. The `ProductName` field in the `Current Product List` field inherits the `Caption` property value `Product Name`, for example.

To view the properties for a field, select the field in the grid at the bottom of the Grid Design view and choose View, Properties. Table 7.2 lists the available properties, Figure 7.9 shows the Properties Window.

Table 7.2 Query output field properties

Property	Function
`Description`	Specifies a description of the field in the query.
`Format`	Specifies the formatting string used to display the data in the field.
`Input Mask`	Specifies the mask used when editing data in the field. This property is available only for fields containing data that you can edit.
`Caption`	Specifies the label caption (for forms and reports) or column heading (for Datasheet views) that will be displayed for the field.
`Decimal Places`	Specifies the number of digits to display to the right of the decimal point (for numeric fields that aren't integers).

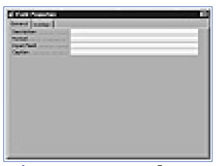

Figure 7.9 The query Field Properties window.

You'll notice that all the properties for the fields in the Current Product List query are empty. That's because the values set in the Product List table design are sufficient for this query. You can override the table's property settings by specifying values for the query fields' properties. You would want to do this, for example, if you wanted a date to appear in a specific format in the query's datasheet view. You would enter a format expression in the field's `Format` property.

The Lookup tab also is available on the Query Properties window. This is useful for fields that can look up values in other tables. See Hour 17, "Creating Tables," for more information on creating lookup fields.

Using Toolbars

Queries have two standard toolbars: one for the two design views and one for the Datasheet view. The Design View toolbar has the same buttons for both Design Grid and SQL view, but some are disabled in SQL view. This section will cover only the buttons specific to query design. Common functions such as Save, Cut, and Paste will not be covered here.

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The Design View Toolbar

Figure 7.10 shows the Design View toolbar. In the upcoming hours, when you modify and create queries, this toolbar will become very familiar to you. Several buttons are not available on the toolbar and are grayed out. These won't be covered in this section.

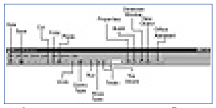
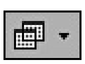
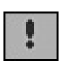
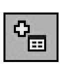
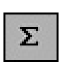
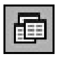
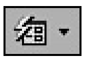
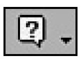


Figure 7.10 The Design View toolbar.

Table 7.3 describes each of the buttons on the Design View toolbar.

Table 7.3 Design View Toolbar Buttons

Icon	Button Name	Description
	Query Type	Displays a drop-down list that enables you to change the query type among the select, crosstab, or various action queries.
	Run	Executes the query. If the query is a select or crosstab query, Datasheet view displays the resulting records. If the query is an action query, you receive a message box informing you of the results.
	Show Table	Displays the Show Table dialog box, which enables you to add tables to the QBE Grid's table pane. This button is disabled in SQL view.
	Totals	Displays the Totals row in the QBE Grid's field grid. Used for creating summations such as Sum, Min, and Max.

	Top Values	Provides an edit box that enables you to limit the query's results to only the top (or bottom) portion of a certain number of records. You can set this to an integer number of records (display the five most expensive products, for example) or to a percentage of the total number of records (display the top 10 percent of the orders for a year, for example). You can click the down arrow button to display a drop-down list of common choices for the Top Values.
	Properties	Displays the Properties dialog box for the currently selected object. You can use this dialog box to edit the properties for the selected object.
	Build	When an appropriate item or property is selected, displays the builder for that object. If the cursor is in the Criteria row of the QBE Grid, for example, clicking Build displays the Expression Builder. Hour 10, "Modifying an Existing Table," discusses the Expression Builder in more detail.
	Database Window	Causes the Database window to become the active window. Provides a quick way to return to the Database window.
	New Object	Displays a drop-down menu that provides a quick way to create an AutoForm or AutoReport based on the current query or to create a new object in the database. AutoForms and AutoReports are wizards provided by Access to quickly create forms and reports having a predefined format.
	Office Assistant	If you installed the Office Assistants, displays the current assistant.

The Datasheet View Toolbar

Figure 7.11 shows the Datasheet View toolbar.

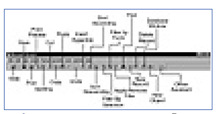
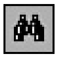
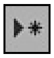
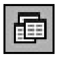
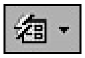
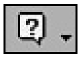


Figure 7.11 The Datasheet View toolbar.

Table 7.4 describes the buttons on the Datasheet View toolbar that are specific to the query datasheet.

Table 7.4 Datasheet View Toolbar Buttons

Icon	Button Name	Description
	Insert Hyperlink	If the current column is a hyperlink column, displays the Insert Hyperlink dialog box.
	Sort Ascending	Using the current column or the selected columns, sorts the data in the datasheet in ascending order.
	Sort Descending	Using the current column or the selected columns, sorts the data in the datasheet in descending order.
	Filter by Selection	Uses the data in the current cell to create a filter. Only data that is the same as the currently selected cell or currently selected text in a cell is displayed in the datasheet. In the Current Product List query's Datasheet view, for example, highlight the letter C in the Product Name column for the Camembert Pierrot product. Then click Filter By Selection. Only those products beginning with the letter C are displayed.
	Filter by Form	Displays a form with all the fields in the query and enables you to create a filter by using a filter-by-example methodology. You enter data into the form that defines the records that will appear in the resulting datasheet.
	Apply/Remove Filter	If a filter is not active, applies the last used filter. If a filter is active, removes the filter criteria to display all the data returned by the query.

	Find	Displays the Find in Field dialog box, which searches the current column for text you enter into the dialog box. This is useful for locating specific records in a query’s returned data.
	New Record	Inserts a new record into the underlying table (if the query can be updated). This button is not as useful in a query datasheet as it is in a table datasheet, but it is available.
	Delete Record	Deletes the current record from the underlying table (if a query can be updated).
	Database Window	Causes the Database window to become the active window. Provides a quick way to return to the Database window.
	New Object	Displays a drop-down list, which provides a quick way to create an AutoForm or AutoReport based on the current query or to create a new object in the database.
	Office Assistant	If you installed the Office Assistants, displays the current assistant.

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Closing Queries

When you finish working with a query, click the box with the X in the top-right corner. If you made any changes to the query's fields or properties, you are prompted to save those changes. Because, for now, you're only looking at queries and how they are defined, click No to avoid changing the Northwind database. You also can close a query window by pressing Ctrl+F4.

Summary

This hour showed you how an existing query is structured and how to view, sort, and filter the data returned by the query. In the next hour, you'll learn all about finding and editing data by using Access 2000 forms.

You'll learn more about queries in Hours 11 and 18.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q When I open the Customers and Suppliers By City query in Datasheet View, I cannot type in any of the cells. Why is this?

A This query is a *union query*. Union queries are not updatable. You should update the tables that make up the query instead. Also, union queries cannot be opened in Grid Design View.

Q When I attempt to open the Employee Sales By Country query, I am prompted to enter a Beginning Date and an Ending Date. What causes this to happen?

A This query uses two parameters in its query definition: `[Beginning Date]` and `[Ending Date]`. Access requires values for these parameters before the query's datasheet can be constructed. See Hour 18, "Creating Queries," for more information on parameters in queries.

Quiz

1. Which field property can be used to specify how data is entered into a field in an updatable query?
2. How can you, in one step, cause all fields involved in a query to be shown in the query's datasheet?
3. While in Datasheet view, when is the Insert Hyperlink toolbar button active?

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Hour 8
Editing Data in Forms

Timothy Buchanan

This hour gives you an introduction to forms. Forms are the most flexible way to view, edit, and delete your raw data. Some topics covered in this hour include the following:

- Looking at the basics of forms
- Working with forms versus datasheets
- Using different views of a form
- Entering data in a form
- Printing data from forms
- Using Form toolbars

Understanding Forms

All the raw data you will use in your database is stored in tables. Although you can view and edit your data in a table, forms provide a much easier and flexible interface to view and edit data. Forms display data from an underlying table or query. Forms enable you to view all or just a few records at once while also viewing all the fields. Table datasheets enable you to view several records at once, but the number of fields you can view is limited. Forms also provide an easy way to enter, change, and delete records.

All the information a form displays is contained in controls. *Controls* are the objects that display data, perform certain actions, and create special effects on the form. You'll learn more about controls in Hour 12, "Modifying an Existing Form Design."

Opening a Form

Now take a look at forms by opening a form in the Northwind database. Make sure that you have the Northwind database open. If you forget how to open a database or do not know how, refer to Hour 2, "A

Quick Tour of Access 2000." When you have the Northwind database open, select the Forms tab. Figure 8.1 shows what your screen should look like at this point.

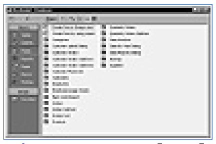

Figure 8.1 The database window with the Forms tab selected, showing all the forms in the Northwind database.

Start with a simple, basic form. Double-click the form name Customers to display the Customers form. This form should be similar to Figure 8.2; it displays the contents of the Customers table. Close the Customers form and double-click on the Customers table. You can see that this is the same information you just viewed in the Customers form but, although you can see many records onscreen at once, you can see only a few fields. Now close the table and open the Customers form again. The globe picture behind the form is a graphic that is displayed only in this form. Graphics and other special effect tools help you design good-looking, easy-to-use forms. Adding special effects to your forms will be discussed in Hour 12, "Modifying an Existing Form Design."

Figure 8.2 The Customers form in the Northwind database.

Note: Microsoft made the forms in the Northwind database very fancy to show off all the power and possibilities of Access 2000. You do not have to create forms that display pictures behind your data or that use special text or formatting. When you are ready to use special effects such as shadows, three-dimensional effects, and graphics, Access 2000 makes it easy to create these forms. For now, just concentrate on learning the basics.

Looking at the Types of Forms

Six basic types of forms are available:

- Single-column
- Datasheets
- Tabular
- Subforms
- Pivot table
- Graphs

In this hour, you'll look at single-column and tabular forms.

Single-Column Forms

The Customers form has a single-column or columnar format (refer to Figure 8.2). Single-column forms show the fields from the table on which they are based in columns. Forms can be more or less than one full screen, depending on your screen resolution. The Customers form should fit on one screen. Single-column forms are a good example of a data-entry screen. Although you can enter all your raw data into tables from the table's Datasheet view, entering data in a form can be easier, much more reliable, and more productive. This is because forms can help prevent redundant data-entry, and provide a simpler interface for adding new data to your tables.

Tabular Forms

The Product List form in the Northwind database is an example of a tabular form. To open this form, click the Forms tab and double-click the Product List form. The form appears, as shown in Figure 8.3. Notice that a tabular form allows you to view several records at one time. Any part of a tabular form can be formatted, allowing for more flexibility in how you display and enter information. Special effects can be added, and you can have multiple lines per record.

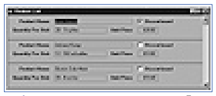

Figure 8.3 Looking at the Product List tabular form in the Northwind database.

You can use the tabular form to see several records at one time, along with all the fields for those records. This type of form is useful for viewing or printing all the records and fields in a table.

Note: Most information on a form comes from an underlying table or query, but information completely independent of a table or query also can be on your form. You can display data such as a company name or logo on the form. More about forms will be discussed in Hours 12, “Modifying an Existing Form Design,” and 19, “Creating Forms.”

Using Forms Versus Using Datasheets

Datasheets enable you to view only limited information about your data. You have little control over the appearance of your information. With forms, however, you can place information on your screen exactly where you want it to be displayed. You also can format each field differently and use several types of special effects. Forms also give you much greater flexibility. Forms provide data validation and the capability to add calculated fields. In addition, you can add pictures such as the globe picture in the Product List form. These graphics or pictures are called *OLE objects*.

Note: OLE stands for *object linking and embedding*. OLE is a Windows method for inserting and embedding objects in Windows applications.

Now you’ll take a look at the different ways to view a form.

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Viewing Forms

When you open the Product List form in the Northwind database, you are using Form view. This is the view you use to enter or change data. To switch to Datasheet view, right-click anywhere on the form and choose Datasheet view. This is the same view as the table Datasheet view; the form displays raw data. The next view of a form is Print Preview, as you can see in Figure 8.5. This view shows how a form looks when printed. Note you cannot right-click to Print Preview; you must use the toolbar button or the File menu. Now right-click anywhere on the form and choose Form Design. Now you are in Design view, as shown in Figure 8.6. Here, you can design the different fields and controls to tell Access how you want to view your data.

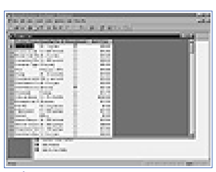

Figure 8.4 Using the Datasheet view of the Product List form.

Figure 8.5 Using the Print Preview view of the Product List form.

Figure 8.6 Using the Design view of the Product List form.

Note: You can print or preview a form from any of the other three views, as well as from the main Database window.

The Design view is where all the work is done to tell Access what data you want to display and in what format. You can open a form in Design view by clicking it in the main Database window and clicking the Design button on the right-hand side of the screen. The form Design view consists of three sections:

- Detail section—Contains the form's main body. All controls are displayed in this section. You cannot delete or remove the Detail section.
- Form Header/Footer sections—Contain information such as title, date, or other information you want to display only at the top or bottom of a form. You can add or remove these sections by choosing View, Form Header/Footer. The data is displayed when you print the form as well as when you view it onscreen.
- Page Header/Footer sections—Contain information such as date, form name, page number, or other information you want to display at the top or bottom of each page, but only in the printed form. These sections do not appear onscreen. You can add or remove these sections by choosing View, Page Header/Footer.

Working with Data in Forms

As mentioned earlier in this hour, the easiest, most flexible, and most reliable way to enter data is using a form. Now you'll see how to enter or change data using a form. I will take a look at how to navigate in a form, as well as data manipulation in a form.

Navigating in a Form

Open the Customers form from the Northwind database in Form view. The form in Figure 8.2 appears. Except for the actual information and graphics on the screen, the rest of the screen should look familiar. The top of the screen has a title bar, menu bar, and toolbar, just like the datasheet. The line at the bottom of the screen is the status bar. The status bar displays the information you entered in the table design for each field. If no information is stored in the description field in the table design for that field, Access displays `FORM VIEW` in the status bar. Directly above the status bar are the form-navigation buttons. You use these buttons to navigate quickly between records. Figure 8.7 shows these various screen elements.

Figure 8.7 Identifying the various elements in Form view.

You also can move around the fields on a form. This is very similar to using a datasheet. You can click any field to make changes or additions, or you can press Tab to move around the fields.

To move from record to record, you use the form navigation buttons found at the bottom of the screen. You can move one record at a time, either forward or backward through the sort order active for the form, using the Next Record and Previous Record buttons. You can also use the Page Up and Page Down keys to move forward and backward, respectively. To move to the first or last record, use the First Record and Last Record buttons. To move to a specific record by number, enter the number in the text box and press the Enter key.

Adding and Editing Records in a Form

Adding and editing records in a form is similar to adding and editing records in a datasheet. If you want to add a new record, click the New Record button at the bottom of the screen. Your cursor moves to the end of the records in the datasheet and displays an empty record on your form. To edit any of the fields, you can click a field with your mouse pointer and type the new information. As you press Tab to move around the form, you can edit the information simply by typing. To select the entire field, press F2 or double-click the field.

Note: Some fields might not be editable because they are locked. You can lock fields in Design view to ensure that no one changes the information stored there. This is a good idea for important information (such as salary information) that rarely changes or should be changed only by certain individuals.

Deleting Records and Data in a Form

Deleting records is very easy. Some forms automatically display a button to add or delete records. If your form doesn't display these buttons, simply select a field in the record you want to delete and press Ctrl+[ms] (hold down Ctrl while pressing the minus sign key). Depending on the table's relationships to other tables, it may not be possible to delete certain records if doing so would create orphaned records in related tables.

Caution: Make sure that you really want to delete a record before you do so. It is not always possible to undo deletions.

To delete information in a field, first select it by tabbing to that field or clicking it with your mouse pointer. Now press Delete or choose Del from the main menu.

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Copying Records

Sometimes you will enter repetitive data or change several records to a new value. To copy information from the same field in the preceding record, select the field and press Ctrl+' (hold down Ctrl and press the apostrophe key). This copies the information stored in the preceding record into the current field. If the field has a default value, you can replace the current value with the default by pressing Ctrl+Alt+Spacebar. You also can insert common information, such as the current date or time, into fields. To insert the current date, press Ctrl+; (hold down Ctrl and press the semicolon key). To insert the current time, press Ctrl+: (hold down Ctrl and press the colon key).

Finding Records Using Forms

You can search for certain records by using forms. To understand how Access finds records, search for information using the Customers form in the Northwind database. Open the Customers form in Form view, click the Contact Name field, and choose Edit, Find from the main menu. A dialog box appears, as shown in Figure 8.8.

Figure 8.8 Using the Find dialog box.

In this example, we will search for any customers named Simpson. Type the name you are searching for in the Find What text box. Several options are available to you in the Find dialog box. Because you know that the information you are searching for is located in the Name field, enable the Search Only Current Field check box. If you were looking for customers from a certain state, you would select the State field before running Find and then select the Search Only Current Field check box. Because you only know the last name of the customer for whom you are searching, select Any Part of Field in the Where section of the Find dialog box. This returns all records that contain the word "Simpson" in any part of the field name. If you knew the customer's first and last name, you would type both and select Whole Field from the Match drop-down list. Now click the Find First button. Access takes you to the first record that contains "Simpson" in the name field, as shown in Figure 8.9. Each time you click the Find Next button, you will be brought to the next record that matches your Find criteria. Ctrl+F is another way to bring up the Find dialog box.

Figure 8.9 Using the Find function with the Northwind database Customers form.

Tip: You can use the Find function with the Replace function to replace numerous instances of the same data. If you need to change all the customers named Smith to Smythe, for example, you can use Find and Replace together to accomplish that feat easily.

Printing Data from Forms

It is easy to print one or more records contained on your form. The printed version looks almost exactly as it does onscreen. The easiest way to print a form is to click Print on the toolbar. This will immediately output the form to the Windows default printer.

You can also choose File, Print from the menu. This will cause the Print dialog box shown in Figure 8.10 to appear. If the dialog box shows the correct printer, click OK, and the form is printed using the font you selected for the form. The printed form displays any formatting or special effects you designed in the form. To change the settings for the printer itself, click the Properties button. To change the page setup (margins and the like), click the Setup button. To specify a range of pages to print, or to print only the selected record (or records), use the Print Range radio buttons. To print multiple copies, modify the entry in the Number of Copies text box.

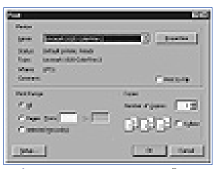

Figure 8.10 The Print dialog when printing a form.

To display what the printed version of the form will look like, choose File, Print Preview or click Print Preview on the toolbar. You can print the form from the Print Preview screen by clicking the Print button on the toolbar, or you can click the Close button to return to Form view.

Closing and Saving Forms

Access automatically saves each record as you move off the record. You can force Access to save the record before you move off it by pressing Shift+Enter (hold down the Shift key while pressing the Enter key). To close and save the form and return to the Database window, choose File, Close or click the close box in the upper-right corner of your screen. If you have not saved your design changes, Access asks whether you want to save the changes.

Summary

This hour provides a quick tour of the basics of forms and how they work in Access 2000. You learned how to open a form, as well as to identify the basic parts of a form. This chapters covers the different views for a form, as well as how to enter, add, delete, find, filter, and sort records. You now should know how to print information from your form, as well as how to save your changes and close your form.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you’ve learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

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ISBN: 0672312891   **Pub Date:** 04/29/99

Q&A

Q **What are some uses of forms other than data entry?**

A Forms can be used to display pictures (in the background of the form, for example) or for graphs or other graphical information.

Q **How can you print the underlying data in a form?**

A When you use the Print function from the Form view, you print the form as you see it. To print the data only, either select the Datasheet view and then print, or print the data from the table or query that the form is based on.

Q **What happens if I shut down my PC without saving the changes on a form? Does Access save it automatically?**

A No, Access automatically saves data that has been entered into a form or table if you have moved to the next record, but does not save any design changes automatically.

Quiz

1. What are the six types of forms in Access?
2. Why should you use forms instead of tables for data-entry use?
3. Where is the underlying data in forms stored?

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Hour 9
Displaying Data in Reports

Timothy Buchanan

In this hour, you'll learn how to preview and print reports. Opening reports, printing reports, understanding the basics of reports, and saving reports will be covered. Reports have many uses, and this hour will introduce their basic functions and capabilities.

Topics that will be covered this hour include

- Understanding the fundamentals of reports
- Looking at the types of reports
- Looking at the differences between forms and reports
- Opening and previewing reports
- Printing reports
- Saving reports
- Closing reports

Examining Report Fundamentals

Reports are the most powerful and flexible way to view and print the information in your database. You can print only the information that is important to any specific request or task, and you can view or print this information in any format or style. You can add other information, such as totals, comparisons, graphics, and pictures. You will begin your understanding of reports by taking a look at how to open them and view them.

Note: *Reports* present a customized view of the information in the underlying table or query. Although reports can be viewed onscreen, it usually is better to print them. If you can imagine a way that you want to view your data, Access probably will be able to generate a report to match.

Using Reports

Reports provide the best way to print information to be distributed, and they provide greater control and flexibility in the overall design. Some major advantages of using reports to print data follow:

- You can easily control font styles and sizes.
- You can easily perform calculations on the underlying data.
- You can format data to fit forms already designed and printed, such as purchase orders, invoices, and mailing labels.
- You can add graphics, such as pictures, graphs, and other elements.
- You can group and organize data to make a report easier to read.

Opening and Viewing Reports

You open a report much like you open a form or table. Select the Report tab in the Database window and then select the report you want to open. You can double-click the report to open it, or you can click on the report and then click Open. Figure 9.1 shows the Products by Category report from the Northwind database. This view is called the Print Preview view of the report. The default Preview view of your report shows it at 100 percent. This setting only enables a small percentage of the actual report to fit onscreen. Later this hour I will discuss more ways to open and view reports.

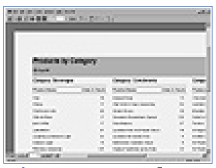

Figure 9.1 The Products by Category report is a tabular report.

Looking at the Types of Reports

Access offers four basic types of reports:

- Tabular reports—Print data in rows and columns
- Single-column reports—Print data as a form
- Mail-merge reports—Print form letters
- Mailing-label reports—Print multicolumn labels

Tabular reports display data in rows and columns, similar to a table. Tabular reports are different from tables, though, because they group their data by one or more field values. Tabular reports also can have other elements, such as page totals, dates, and subtotals. They are usually used to calculate and display subtotals for the numeric fields for groups in the report. Figure 9.1 shows the Print Preview screen of the Products by Category tabular report from the Northwind database.

Single-column reports display data vertically, with one or more records per page. These reports display data much like data-entry forms, but they are for viewing and printing only—not for entering data. The Northwind database uses a single-column report to print invoices. Figure 9.2 shows the Print Preview screen of the Invoice report.

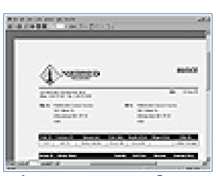

Figure 9.2 The Invoice report is a single-column report.

Note: The Invoice report has many examples of report capabilities. The report uses graphics, grouping, and totals to create a good-looking, multifunctional report.

You use mail-merge reports to print form letters using data from your database. These reports are linked to Microsoft Word to sort and print the mail-merge documents. You can find more details about these kinds of forms in Access's Help feature. Look in Help under Mail Merge for a complete walk-through of the procedures.

You can use the Mailing Label Report to create labels from several different sizes of Avery brand labels. You generate this report by using the Mailing Label Report Wizard. Figure 9.3 shows the Print Preview screen of the Customer Labels report, which is a mailing-label report from the Northwind database. The quality and ease of printing mailing labels will depend on your printer. A good laser or ink-jet printer is recommended for best results.

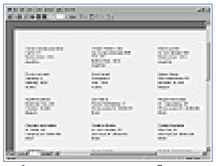

Figure 9.3 The Customer Labels report is a mailing-label report.

Looking at Forms Versus Reports

Forms and reports are similar in many ways, but they serve two very different purposes. The main difference is the reason for the output. Forms generally are used for data entry, whereas reports are used to view data onscreen or on paper. You can display anything onscreen with a report that you can display with a form. Both forms and reports are based on the data from underlying tables or queries, but only forms can add or change the original data.

Note: Access enables you to save a form as a report. This capability is helpful when you want to base a new report on a form that you already have created. After you save the form as a report, you can customize the report. To save a form as a report, select File Save As from the main menu, and select Report from the Save As dialog box.

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More Ways to Open and View Reports

Now that you know how to open and view a report, what a report is, and what its function is, here are some additional ways to open and view reports. Again, the Print Preview option only shows a small percentage of the report. To see more of the report, move your mouse over the report. The mouse pointer changes to a magnifying glass with a minus sign inside it. After you click the report with this icon displayed, the report zooms out so that the whole report is displayed onscreen. This is called the Page Preview view. (See Figure 9.4.) You also can select the Zoom drop-down list from the toolbar. This list gives you several percentage options to view the report. When you move the mouse over the report now, the magnifying glass icon has a plus sign inside it. Clicking the report returns the view to the original 100-percent view. You can view the entire report by dragging the elevator boxes in the vertical and horizontal scrollbars. Also, you can use the page controls at the bottom left corner of the screen to move around between pages.

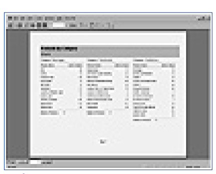

Figure 9.4 Using Page Preview to show the entire Products by Category report onscreen.

The Preview screen offers several options. The first button on the toolbar (on the far left) is the View button. You click this button to toggle between the Design and Preview views of the form. You can use other buttons on the toolbar to print, close, and export the form to other Office products. You will learn how to export reports in Hour 20, “Creating Reports.”

You also can open a report in Design view by selecting the report from the Report tab in the main database window and clicking Design. Figure 9.5 shows the Products by Category report in Design view.

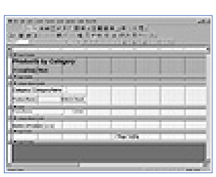

Figure 9.5 Viewing the Products by Category report in Design view.

Note: Notice how the report Design view looks very similar to the form Design view. Many of the functions of a form are the same as a report. The only difference is the actual output. The main difference in the Design view is the different sections that make up the report. Forms and reports both contain a Detail section, but reports also provide several different headers and footers that you can use to better display data.

Printing Reports

You can print your reports in several ways:

- Click the Print button in the Print Preview screen.
- Highlight the report from the Report tab in the main database window and then choose File, Print from the Database window.
- Highlight the report from the Report tab in the main database window and then click the Print button in the Database window.

When you use any of the File, Print methods, the standard Windows 98 Print dialog box appears, as shown in Figure 9.6. You use the Print dialog box to choose the printer that will print the report, what pages to print, what range of pages to print, how many copies, and other printer properties.

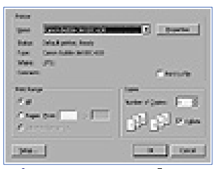

Figure 9.6 The Windows 98 standard Print dialog box gives you several options to choose from when printing a report.

Note: After you click the Print icon, the report prints from the default Windows 98 printer; a dialog box is not displayed.

You use the Page Orientation option in the Print dialog box to print your report in portrait or landscape orientation. Click the Setup button in the Print dialog box to change this option. This is saved with the report, so you only need to set it once.

You use the Print Range option to choose which pages of the report to print. You select All to print the entire report. You choose Selection to specify what range of pages to print, and you select Pages to print only the pages you specify in the From and To boxes.

Tip: Sometimes, extra blank pages are printed when you print your report. This usually happens because the dimensions of the report are larger than the size of the paper. Make sure that the width of the report plus the width of the margins does not exceed the width of the paper.

Tip: Another common problem is too many blank areas surrounding sections of data on the report. You might get an error when printing a report that tells you that some sections might be too wide to fit on the page, or you might have simply placed the objects on your report too far apart. To remove this blank area, resize the sections to better fit the information being displayed. You can resize any controls on the report by moving the mouse over the lines of the box in Design view, and clicking and dragging the lines to resize them to fit the data being displayed.

Closing and Saving Reports

You can save reports at any time by choosing File, Save. Or you can choose File, Save As/Export if you want to change the name of the report. When you save a report for the first time, or exit a report the first time without saving it, a dialog box appears and asks you to name the report. In this dialog, Access will provide a default name, Report1 for example, which you should change to something more descriptive.

Summary

This hour was devoted to studying reports and how they display data. You learned what kinds of reports Access offers, and you learned about the differences between forms and reports. You also looked at the many ways to print and preview reports. You will take another look at reports and learn how to create and modify them in Hours 13, “Modifying an Existing Report,” and 20, “Creating Reports.”

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Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What other elements can be added to reports?**

A Graphics, images, graphs, different fonts, colors, and lines. Just about anything you want to make your report look better can be added.

Q **Can reports be saved in other formats? My boss wants to see my report onscreen, but he does not have Access.**

A Yes, you can save reports in Word or Excel format. The Save As function has this feature.

Quiz

1. What are reports?
2. Why should I use reports?
3. What are the four basic types of reports?
4. What is the difference between forms and reports?

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Part III
Modifying an Existing Database

Hour

10 Modifying an Existing Table
11 Modifying and Using Existing Queries
12 Modifying an Existing Form Design
13 Modifying an Existing Report

Hour 10
Modifying an Existing Table

Craig Eddy

In the first section of this book, you learned all about viewing and using existing database objects. With that knowledge safely in hand, this section of the book will help you learn all about modifying tables, queries, forms, and reports that already exist in a database.

In this hour, you'll learn how to modify existing tables. You'll learn how to modify table properties, modify fields, and add and delete fields from the table. Also, you'll learn more about primary keys, indexes, and table relationships.

The highlights of this hour follow:

- Changing the table design
- Modifying, adding, and deleting fields
- Understanding primary keys and indexes
- Editing table relationships
- Using the Field Builder

- Using the Expression Builder

Changing the Table Design

The bulk of this hour will be spent discussing how to modify an existing table’s structure. You’ll learn how to modify a table’s properties, change the fields available in a table, and modify the properties of the fields in a table.

Figure 10.1 shows the Tables section of the Database window for the Northwind database. The list is shown in Details view, which you get to by clicking the Details button on the Database window. This list is where you’ll start all the design changes in this hour.

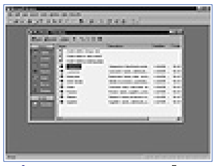

Figure 10.1 The Tables tab of the Northwind Database window.

Looking at Table Properties

Like all objects in Access databases, tables have properties as well. To modify the properties for a given table, select the table by clicking its name in the Database window’s Tables list. Then right-click and choose Properties from the shortcut menu. Alternatively, you can select the table and choose View, Properties. The Table Properties dialog box then appears, as shown in Figure 10.2. The title bar of the dialog box changes to show the name of the table whose properties you’re editing.

Figure 10.2 The Customers Properties dialog box for the Northwind database.

In the Table Properties dialog box, you can change the description of the table, hide the table, and—if the database is the design master of a replicated database—specify whether the table is replicated to other databases and whether the table utilizes row-level or column-level conflict detection.

New Term A *replicated database* is a database that has been specially set up to be copied to one or more other databases. The copies can than be synchronized, copying data changes to all copies of the replicated database.

The Table Properties dialog box also shows the dates and times the table was created and last modified. The `Owner` field specifies the user who created the table and is useful only if you’re using Access 2000’s security features. The security features are discussed in Hour 23, “Database Administration.”

If you change the table’s description, the change is reflected when you return to the Database window. If you check the Hidden box, the table disappears from the Database window. You might want to hide a table, for instance, if it contains data that other users should not have direct access to. Hiding the table does not necessarily prevent such access, but it does make it more difficult to get to the table.

> **Note:** Access provides you with an option to view tables which are marked as hidden. To turn on this option, invoke the Options dialog (use the Tools menu and click Options). On the Options dialog’s View tab, check the box labeled Hidden objects. When you return to the Database window, the hidden tables will now be visible.

Tables also have record-level validation rules and can be provided with a default filter and sort order that are applied when the table is opened in a data view (Datasheet, Form, or Report). To set these properties, make sure that the table Design View window is active. Then choose View, Properties, click the Properties toolbar button, or press Alt+Enter. For more information on sorting and filtering data, see Hour 5, “Using the Datasheet View.”

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Modifying, Adding, and Deleting Fields

Just because you have a database design that works for today's needs doesn't mean that you won't need to make modifications to the database's table structure in the future. It often becomes necessary to add and modify fields to one or more tables as new needs are discovered. It also might be necessary to delete fields from a table, but this should be done only with careful consideration. Chances are that if a field already contains data, you won't want to delete the field altogether; instead, you simply might want to move the field to another table.

All these changes are performed in the table Design View. Open the Northwind database and select the Tables section on the Database window. Select the Customers table and click Design. The Design View window for the Customers table appears, as shown in Figure 10.3.

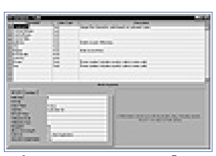

Figure 10.3 The Customers table in Design view.

Modifying Fields

When modifying an existing field, you can change several attributes. These attributes include the field's name, data type, description, and properties. In most cases you'll be modifying the field's properties, which you'll learn more about a little later in this hour.

You modify the field's name, data type, and description using the top portion of the Design View window. To change the field's name, for example, click in the Field Name column for the field you want to change. The cell containing the field's name works like a standard Windows edit box: You can highlight text; cut, copy, and paste (including using the Office Clipboard toolbar); and use the arrow keys to move back and forth in the text that makes up the field's name. You can modify the field's description in a similar manner.

To modify the field's data type, click in the Data Type column and then click the down arrow on the button that appears at the right side of the cell. Select the new data type to be used.

Note: If you change a field's data type and the field already contains data, Access attempts to convert that existing data to the new data type. If you have a field that contains text data and you attempt to change the field to the Number data type, Access attempts to convert the text data to numeric form. This works just fine, as long as the field contains nothing but numerals. If records with any nonnumeric data exist in the field, Access displays a warning message. If you allow Access to continue, the contents of the field are cleared for these records.

Suppose that you want to select the `PostalCode` field and change its data type to `Number`. Choose File, Save to save the table. A message box appears when Access attempts to update the data type. If you choose Yes, the contents of those fields are cleared. If you choose No, the table design is not saved and you are returned to the table Design view. You then should change the field's data type back to Text, or simply close the Design View window and choose No when Access prompts you to save the table's design.

Adding Fields

When modifying a table's design, you are usually adding fields to the table. Fortunately, Access 2000 makes adding fields a simple process.

You add fields to a table by using the table's Design View window. You can add a field to the bottom of the Field list by clicking in the row below the last field. In Figure 10.4, I have clicked in the row below the `Fax` field. Access is now ready to accept the new field's name, data type, and other properties. Simply type the name for the field. Next press Tab or click in the Data Type column to set the new field's data type. You then can press Tab or click in the Description column to enter the description.

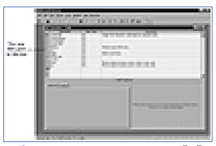

Figure 10.4 Adding a field to the Customers table.

You must click in the Field Properties section at the bottom of the Design View window if you want to change the new field's properties from their default values. If you just press Tab while the cursor is in the Description column, you wind up in the Field Name column of the next row.

If you want to insert a field between existing fields in the table, select the field you want to appear after the new field. Choose Insert, Rows to insert a blank row into the grid. Add the field by following the steps outlined earlier in this section.

Deleting Fields

Access 2000 enables you to delete fields as well. You should be careful when deleting fields that have data in them, however. Make sure you really want to delete the fields before proceeding.

To delete a field, simply select it in the top of the table Design View window and choose Edit, Delete Rows. You can delete multiple fields at once by pressing Ctrl while clicking in the row-selector column (the leftmost column of the grid) for each field you want to delete. Then choose Edit, Delete Rows. If you have saved the table's design since the fields to be deleted were added (which is the case most of the time), Access will confirm that you really want to delete the fields. Choosing Yes causes Access to delete the fields and any data they contain.

If a field to be deleted has one or more relationships with other tables, you will be unable to delete the field until all these relationships are dissolved. You will learn more about this subject in the section titled "Editing Table Relationships," later in this hour.

Using the Field Builder

You can add a field manually, but Access 2000 also provides a Field Builder feature. You can use the Field Builder to choose from a wide range of predefined fields that can be added instantly to your table. This is by far the easiest way to add fields to a table because the Field Builder also sets properties such as the Caption, Input Mask, and Format properties.

To use the Field Builder, click in the grid at the top of the table Design View window. Right-click and choose Build from the shortcut menu, or click the Build toolbar button. The Field Builder then appears, as shown in Figure 10.5.

Figure 10.5 Using the Field Builder to add a field.

You can select from business or personal tables by selecting the radio buttons at the bottom left of the Field Builder dialog box. Select a table and field combination in the Sample Tables and Sample Fields list boxes. Next click OK to add the new field—properties and all—to the table.

Because you're working with the Customers table, select `Customers` in the Sample Tables list box. The Sample Fields list box changes to show fields related to customer data. Select `EmailAddress` in the Sample Fields list box and click OK. The new field is added to the Customers table and even has a caption specified.

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Field Descriptions

To edit the description of a field, simply press Tab or click to place your cursor in the Description column. The text in the Description column is used as default status bar text whenever the field has *focus* (whenever the edit cursor is in the field) when the field is displayed in a Datasheet view or a form.

Field Properties

To change any of a field's properties, you first select the field in the top of the Design View window. Then click in the Field Properties section at the bottom of the window. Select the property you want to modify. Table 10.1 lists the various field properties and their purpose.

Table 10.1 Field Properties

Property	Usage
`Field Size`	Defines the amount of data a field can hold.
`Format`	Defines the way that the data contained in the field is displayed.
`Decimal Places`	Only available on `Numeric` data type fields, this property specifies the number of digits that will appear to the right of the decimal point.
`Input Mask`	Provides a mask which dictates how users enter data into the field.
`Caption`	Used as the datasheet column header or as the default caption for the field's label when the field is used on a form or report.
`Default Value`	The initial value for the field when a new record is created.
`Validation Rule`	Defines what constitutes valid data for a field.
`Validation Text`	The message that will be displayed should a user enter data that violates the `Validation Rule` property.
`Required`	Indicates whether or not data is required in the field in order to save the record.
`Allow Zero Length`	This property determines whether or not zero-length strings are valid within a `Text` field.

`Indexed`	Specifies whether or not the field should be indexed, and if so whether or not the same value should be allowed on multiple records.

The edit box for any property comes in one of three control types. There's a standard edit box, a drop-down list box, and an edit box that sports a button with an ellipsis. The first two boxes are standard Windows 95 edit controls. The third control is used to invoke the Expression Builder shown in Figure 10.6 or, in the case of the `Input Mask` property, an Access wizard. The valid property values determine which control type is used for the edit box.

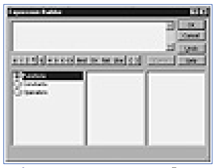

Figure 10.6 The Expression Builder.

> **Note:** The Input Mask Wizard is an advanced wizard that is available only if you installed the advanced wizards when you installed Access 2000. If you did not install the advanced wizards, you can use the Control Panel Add/Remove Program applet to add the advanced wizards to your Access 2000 setup. See Hour 2, "A Quick Tour of Access 2000," for information on installing Access 2000.

To change a property that has the standard edit box, simply click in the box and make your changes. To change the field size of the Customers table's `City` field to 30, for example, select the `City` field, double-click in the `Field Size` property text box and type `30`.

To change a property that has the drop-down list box control, select the field and then click the down-arrow button. Select an item in the list to change the property's value. There are several properties that have Yes/No values. These also use the drop-down list box.

To change a property using an Expression Builder, select a property such as `Validation Rule`. Click the ellipsis button that is at the right-hand side of the property's edit box to invoke the Expression Builder. The Expression Builder makes it easy to create complex expressions by using a point-and-click method. Select one of the items in the leftmost list box, and the other two list boxes display items you can use in your expression. With the Functions folder in the leftmost list, you must double-click to expose subfolders that contain expression items. You also can type directly into the text box at the top of the dialog box, as well as use the many buttons located between the Expression text box and the list boxes. These buttons enable you to insert common operators (such as add, subtract, multiply, and divide) and expressions by pointing and clicking.

Testing Validation Rules

Let's say you did change the value of the `Validation Rule` property for several fields. Access 2000 has a new feature which will enable you to test validation rules (as well as several other properties) on demand. You'll have to save your table's design before proceeding, but, if the table has a good bit of existing data, using this feature after each change to a `Validation Rule` will save you time. Any existing data which violates the `Validation Rule` will be left as-is in the table, but you'll know that your `Validation Rule` already has data which doesn't fit its constraints.

While on the table's Design View window, you can test the validation rules, the `Required` property, and the `Allow Zero Length` property using a simple menu command. To test these rules and properties, choose Edit, Test Validation Rules. Access will display a dialog box explaining what's about to happen and warning you that the test could take some time. Click Yes to continue. Access will check all the rules and properties and inform you if any records violate them.

Understanding Primary Keys and Indexes

In the relational database model on which Access 2000 is built, primary keys uniquely identify records. Indexes help the performance of the database engine when it's called upon to search and sort records in your tables, be they stored within an Access file or on a SQL Server. Both primary keys and indexes are very important to any good database design. In this section, you'll learn how to view and modify the primary keys and indexes for a table.

NEW TERM A *relational database model* is a database model that groups the underlying data into one or more discrete tables that can be related to one another by using fields common to each table.

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The Primary Key

A *primary key* is a field or a set of fields that uniquely identifies each record stored in a table. Although primary keys are not required, they are necessary if you want to relate the table to any other table in the database.

Refer to Figure 10.3, which shows the Customers table in Design view. The primary key for the Employees table is the `CustomerID` field. This is represented in the Design View window by a Key icon in the row-selector column (the leftmost column) of any fields that make up the primary key. To change the primary key fields, simply select the fields that should make up the primary key by pressing Ctrl while clicking the row-selector column of each field. Then choose Edit, Primary Key or click the Primary Key button on the toolbar. (Its picture is identical to the Key icon that appears in the Design View window.)

Note: If the table has relationships with other tables and its primary key is involved in those relationships, you will not be able to modify the primary key. You first must dissolve any relationships involving the table's primary key before modifying the primary key's fields.

Indexes

Indexes are used to optimize searching and sorting by the database engine. If certain fields will be used more often than others for searching the table, they probably should be indexed. You can create an index on a single field or on multiple fields. Use a multifield index in cases where the first field can have duplicate values in the table. Indexes can cause some operations, especially updating and adding rows to the table, to take longer, so you should be careful not to over-index your tables.

To view and modify the indexes for a table, choose View, Indexes or click the Indexes toolbar button while the table's Design View window is active. This opens the Indexes window for the current table. Figure 10.7 shows the Indexes window for the Customers table.

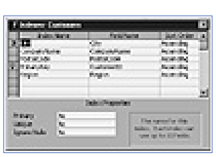

Figure 10.7 The Indexes window for the Customers table.

In the Indexes window, you specify the name for the index, the fields that make up the index, and the sort order for each field in the index. To create an index made up of more than one field, enter the index name, a field name, and a sort order on the first available row. In the next row, leave the index name empty, and specify the next field name and sort order. Do this for each additional field in the index.

In Figure 10.7, you can see that the Customers table has five indexes: `City`, `CompanyName`, `PostalCode`, `PrimaryKey`, and `Region`. As you can see, the table's primary key also is used to create an index on the table. You can give an index any valid object name, as long as you don't use the same name twice for a given table.

By using the row-selector column, you can insert and delete rows into the grid. To delete an index, select its row by using the row selector and press Del. To insert rows, select the row that will appear below the new row and press Ins.

Caution: If you attempt to use the Edit and Insert menus, your actions are applied to the Design View window rather than the Indexes window.

Saving the Table Design

After you make all the necessary changes to the table's design, you must save the design. Click the Save button on the toolbar, choose File, Save, or press Ctrl+S. Access attempts to save the table design.

If you made any changes that affect validation rules, Access asks whether you want to check any existing data against these new validation rules. Figure 10.8 shows the message box that asks this question. If you have the Office Assistant running at this time, the assistant will ask you the question in the form of a balloon-like window.

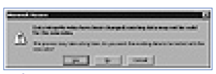

Figure 10.8 A message informing you that the data integrity rules have changed and asking whether you want to test the existing data with the new rules.

If you choose Yes, Access tests the existing data against the new rules. If any data fails to meet the validation rules, Access displays the dialog box shown in Figure 10.9.

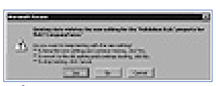

Figure 10.9 A message box telling you that the data integrity rules have been violated.

If you want to keep the new validation rule even though some data doesn't meet the requirement (not a good idea), choose Yes. The invalid data will remain in the table even though it violates the validation rule. If you want to change the validation rule back to the old setting, choose No. To cancel the operation, choose Cancel. You should (in most cases) choose No from this message box, save your table using the reverted-to validation rule, adjust the data accordingly, and attempt to change the validation rule again (if you still want to use the new rule).

If you have made changes to any field's data type, Access attempts to convert any existing data in that field to the new data type. If it cannot convert the data, the message box shown in Figure 10.10 appears.

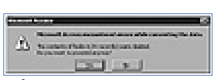

Figure 10.10 A message box informing you that a data conversion error has occurred.

If you really do want to change the data type, regardless of whether all the data can be converted, choose Yes. The conversion will continue, and any data that doesn't fit into the new data type will be lost. If you do not want to lose any data, click the No button, change the data type back to its old value, save the table, and adjust the data accordingly.

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Editing Table Relationships

As I've mentioned several times in this hour, it is possible for tables in a relational database to be related to one another. That's where the term *relational* comes from, after all. For example, in the Northwind database are a Customers and an Orders tables. The two tables are related to each other by a common field: `CustomerID`. In the Customers table, `CustomerID` is the primary key which uniquely identifies each customer. In the Orders table, `CustomerID` specifies which customer placed the order. This relates an order (which is represented by a record in the Orders table) to a specific customer (which is represented by a record in the Customers table).

To edit relationships in an existing database, use the Relationships window shown in Figure 10.11. You open the Relationships window by choosing Tools, Relationships.

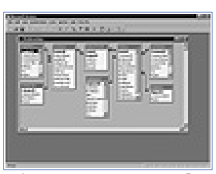

Figure 10.11 The Relationships window for the Northwind database.

> **Note:** You cannot edit a table's relationships if that table is opened in Design view. Be sure to close any Design View windows for tables whose relationships you want to modify.

To edit a relationship, double-click the thinner portion of the line joining the two tables that have the relationship you're modifying. The Edit Relationships dialog box shown in Figure 10.12 appears. From here, you can modify the properties pertinent to a relationship in Access 2000. These properties are discussed in greater detail in Hour 17, "Creating Tables."

[Figure 10.12](#) The Edit Relationships dialog box.

To dissolve a relationship, click the line joining the two tables and press Del. To create a new relationship, select the field in the master table and drag it to the related field in the other table. To try these activities, select the line that joins the Employees and Orders tables. Press Del. Access asks you to confirm that you really want to remove the relationship; choose Yes.

NEW TERM The term *join* is used to denote a relationship between two tables. The tables are said to be *joined* if there is a relationship between them.

NEW TERM The *master table* in a relationship is the table in which the field or fields used to join the tables is the primary key.

Now it's time to replace the relationship. Click and hold down the mouse button while the pointer is over the `EmployeeID` field in the Employees table. While keeping the mouse button pressed, drag the field name over the `EmployeeID` field in the Orders table. Release the mouse button to drop the field name onto the Orders table's `EmployeeID` field. The Relationships dialog box appears. Check the Enforce Referential Integrity check box. This causes Access to ensure that any data entered in the `EmployeeID` field in the Orders table has a corresponding `EmployeeID` value in the Employees table. It does not mean, however, that every employee must have a corresponding order. Click Create to finish creating the new relationship.

NEW TERM *Referential integrity* consists of rules used to ensure that data contained in fields involved in a relationship with another table is valid in that table. Referential integrity is checked when data in such fields is updated, added, or deleted.

After you finish modifying the relationships, you must save the Relationships window's layout before you can close the window. You can choose File, Save; click the Save toolbar button; or press Ctrl+S.

Summary

In this hour, you learned about the process of editing an existing table's definition. You will use most of what you learned here again in Hour 17. By now, you should be able to view and modify all the pertinent pieces of a table's structure: field names, data types and properties, primary keys and indexes, and table relationships. You also should be adept at adding and removing fields from an existing table.

The next hour delves into modifying existing queries. This is when you'll learn how to really make Access 2000 give you the answers to your data-related questions.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q Some of the tables have disappeared from the Tables list. What happened to them?

A One of two things: You deleted the table or you changed the table properties and marked the table as hidden. To view hidden tables, choose Tools, Options to display the Options dialog box. Select the View tab and enable the Hidden Objects check box in the Show section. Click OK and return to the Database window's Tables tab. If the tables still do not appear, you probably have deleted them. Otherwise, the hidden tables now should be listed, and you can modify their properties to make unhide them (see "Looking At Table Properties," earlier in this hour).

Q Whenever I attempt to edit or delete a relationship, I get a message box informing me that one of the tables is in use by another person or process. How do I resolve this problem?

A More than likely, the table specified in the message box is opened in Design view. Use the Window menu to see if the table has an open window. If it does, click its entry in the Window menu and close its window.

Quiz

1. What types of controls are available for editing field properties?

2. How can you view and modify the indexes defined for a table?
3. Can you change a field's data type if it already contains data?
4. What tool can you use to verify validation rules on demand?

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Hour 11
Modifying and Using Existing Queries

Craig Eddy

In this hour, you'll learn how to take an existing query and modify it to better suit your current needs. This is probably the easiest way to learn about defining and using queries. You can take advantage of the work someone else has done in setting up the query by building on that foundation.

You might want to modify a query to add additional fields to its output, or you might need to modify the criteria that a query uses to determine which records to include in its output. For either of these needs and many others, the material in this hour provides you with the information you need to make a query work your way.

The topics covered in this hour follow:

- Using the Field list
- Using the Design Grid
- Specifying criteria
- Querying multiple tables
- Using properties

This hour uses queries from the Northwind sample database that ships with Access 2000. If you have not installed the sample, return to Hour 2, "A Quick Tour of Access 2000," for instructions on installing the sample databases.

Using the Field List

As you saw in Hour 7, "Using Existing Queries," queries have two design views. The SQL View enables you to examine and edit the actual SQL coding that defines the query. The Design View provides you with a visual tool for building your queries. You'll learn about the Design View throughout most of this hour.

Figure 11.1 shows the Design View for the Current Product List query. To get to the Design View, activate the Database window and display the Queries list by clicking on the Queries entry in the Outlook bar. Then select the Current Product List query and click the Design button.

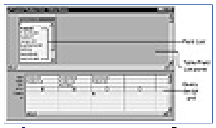

Figure 11.1 The Design View for the Current Product List query.

This section discusses the Field List pane, which is the top half of the Design View.

The Field List for the Current Product List query contains fields from the Products table. This table is represented by the list box with the caption Product List (as you'll see later in this hour, this caption is set by the Alias query table property). This list box is the Field List for the Products table.

The Field List has an entry for each field in the table. It also has an entry containing only an asterisk (`*`). This entry represents all the fields in the table; when used, it will cause all fields in the table to be included in the query. An asterisk is also used in the SQL code to represent all the fields in the SQL statement (such as `SELECT * FROM Products`).

Also, notice that the `ProductID` field is in bold type. This signifies that the field is part of the Products table's primary key. The primary key field is used to link this table to other related tables that can be added to the query as needs dictate.

It's a simple matter to add a field from the Field list to the query design grid at the bottom of the window. You can use any of several methods. First, you can double-click the field's name to place the field in the first available column of the Design view's grid. This means that this field appears as the last (right-most) column in the Datasheet view when the query is executed.

Second, you can add a field to the grid by clicking the field name and dragging it onto the grid. You can control which column the field is displayed in by using this method as well. The column onto which you drop the field shifts to the right, and the new field is placed in front of the other fields. You also can select multiple fields from the Field list (by holding down the Shift or Ctrl keys when you click a field's name) and drag and drop them to add them to the grid.

Caution: The drag-and-drop action cannot be undone and produces no confirmation message, so the only way to revert to the old query is to close the query without saving. Use this with caution!

The Field List also has a shortcut menu, which you access by right-clicking while the pointer is over the Field List. The shortcut menu contains two items. The first item is Remove Table, which removes the selected table and all its fields from the query. The second item is Properties, which displays the Table Properties window discussed in the section "Working with Properties," later in this hour.

To add tables to the Field List pane, you first must display the Show Table dialog box. (See Figure 11.2.) Just choose Query, Show Table.

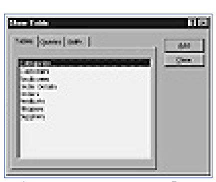

Figure 11.2 The Show Table dialog box.

As you can see, the Show Table dialog box has three tabs: Tables, Queries, and Both. The Tables tab displays a list of all the tables in the database. The Queries tab displays a list of all the queries saved in the database. Queries don't have to be based only on tables. They can also be built using other queries that have been defined in the database. The Both tab displays a list of both the tables and the queries.

To add a table or query to the query's Field List pane, you can double-click the item's name or select the item and click Add. You can select multiple items by holding down the Shift or Ctrl keys before clicking the item's name. Next click the add button to add all these items at once. When you add a table that is related to a table already in the query, a line is drawn between these related tables to show the fields that *join* the two tables. Suppose that you add the Categories table to the Current Product List query. A line is drawn between the `CategoryID` field in the two tables, as shown in Figure 11.3.

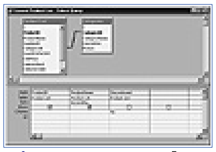

Figure 11.3 The Current Product List query with the Categories table added.

New Term A *join* describes the relationship between two tables in a relational database. The tables are *joined* because a field or group of fields is common to both tables. This join forms the relationship between the two tables.

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Using the Design View's Grid

The area at the bottom of the Design view is the Query by Example (QBE) grid. This is where the various field-specific attributes of the query are defined. Each field added to the query has its own column in the QBE grid. The rows in the grid represent different attributes for the field. There are rows for field name, table name, sort order, and visibility of the field in the result set; there also are rows for setting result set criteria based on the field.

The Field Name and Table Name rows contain drop-down list boxes that enable you to change the field represented by the column or to add new fields to the query. Simply select the desired table and field from the drop-down lists. To add a field, select an empty column in the grid and choose the table name and field name. If the required table does not appear in the list, you must add it to the Field List pane using the instructions in the earlier section, "Using the Field List."

To remove a field from the query, move the pointer over the top of the field's column until the pointer changes to a down arrow. Now click on the column header to select it. Press Delete to remove the field. You also can remove a field by clicking in any row in the field's column and choosing Edit, Delete Columns.

Caution: This field-removal action cannot be undone, so use it with caution.

To move a field to a different column position (and change the field's display column in Datasheet view), select the column. Next click the column's header and drag-and-drop it at the desired location.

Specifying the Sort Order and Showing Fields

For each field in the query, you also can specify the sort order and whether the field is included in the query's result set. Each of these attributes has its own row in the QBE grid.

The sort order determines how records are ordered when the query executes. You specify the sort order by using the Sort row's edit box. Just open the drop-down list box and choose Ascending, Descending, or Not Sorted, which is equivalent to having no entry in the Sort row.

Refer back to Figure 11.1, or if you're following along in Access 2000, look at the QBE grid in the Design

View for the Current Product List query. The `ProductName` field is sorted in ascending order. This means that the products are listed in alphabetical order (from A to Z). If you execute the query by choosing Query, Run (or clicking the Run toolbar button), you'll see that the products are indeed listed in alphabetical order. Return to the QBE grid by choosing View, Design View and change the sort entry for the `ProductName` field to Descending. Run the query again, and observe carefully that the products now are listed in reverse alphabetical order. Amazing, isn't it?

Note: To review some important considerations to keep in mind when setting the sort order, search the Access 2000 Help file for the phrase "sorting data, overview" and review the tips.

In Figure 11.1, the Show row contains a checkbox for each field in the query. If the box is checked, the field appears in the query's output. If the box is not checked, the field does not appear. This option is available because you might want to use a field as part of the sort order or criteria but not display it to the user.

In the Current Product List query, the `Discontinued` field is not shown. It specifies the criterion for being a current product: The `Discontinued` field must be set to `No`. Because all records returned have their `Discontinued` field set to `No`, there's really no need to display the field; its value is implied by the fact that the product is included in the query's output.

Just for fun, check the Show checkbox for the `Discontinued` field and execute the query. You see that none of the products has its `Discontinued` field checked, as shown in Figure 11.4. This is because all the records returned by the query have their `Discontinued` field set to `No`.

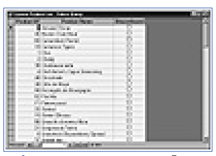

Figure 11.4 The Current Product List query with the *`Discontinued`* field visible.

Tip: Of course, if you want to provide a quick way for the user to mark current products as being discontinued, displaying the `Discontinued` field in the query's output is the perfect way to do so. Users can then simply check the box in the Discontinued column for any products that have been discontinued. The user will have to rerun the query to have the discontinued products removed from the datasheet, though.

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Specifying Criteria

Part of the reason why queries exist is to draw from the database records that match specific criteria. The list of current products consists of all those products that are not discontinued, for example. The products that are discontinued are not included in the current product list.

The rows that start with the Criteria row in the QBE grid are where you specify the data that must be present in a field in order for that record to be included in the query's result set. You can specify multiple criteria in an `OR` fashion by entering the different values on separate rows in the field's column. This means that if the field's value in a record matches a condition on any row, that record will be included in the query's output.

The entries made in the Criteria rows must be valid Access expressions. The Criteria edit boxes have an Expression Builder Wizard that can help you quickly build a valid expression. (Figure 11.5 shows the Expression Builder.) You access the Expression Builder by clicking the Build button on the toolbar (the Magic Wand icon) or by right-clicking the Criteria edit box and choosing Build from the shortcut menu. The Expression Builder is covered in Hour 10, "Modifying an Existing Table," and isn't covered in detail here.

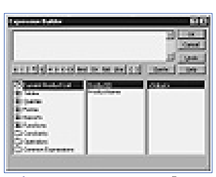

Figure 11.5 The Expression Builder dialog box.

Now you'll look at a few common examples of using criteria to change a query's output. These examples use the Current Product List query, so open that query in Design view if you're following along in Access 2000.

In the first example, you will modify the query so that only the current products on order are returned when the query is executed. The Products table has a `UnitsOnOrder` field, which shows the number of units ordered for a product. Add that field to the grid by double-clicking its name in the Field List.

Next, click in the Criteria row for the `UnitsOnOrder` field. To see which products are currently on order, type `>0` in the edit box. Your screen should now resemble Figure 11.6. Now execute the query by choosing Query, Run or by clicking the Run toolbar button. Figure 11.7 shows the results. Instead of 69 records, as you saw in earlier executions of this query, there now are only 17.

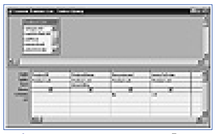

Figure 11.6 The QBE grid for the Current Product List query with the *`UnitsOnOrder`* field added.

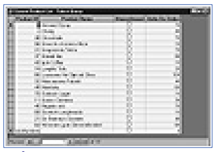

Figure 11.7 Viewing the Current Product list with additional query criteria.

Now suppose that you want to return only the products that cost between $10 and $50. First, remove the `UnitsOnOrder` field by clicking its column in the grid and choosing Edit, Delete Columns. Add the `UnitPrice` field by double-clicking its name in the Field list. Click in the field's Criteria edit box and type `>=10 and <=50`. Now when the query is executed (assuming that you haven't modified any of the information in the Products table), you should see 54 rows—all with prices between $10 and $50.

Querying Multiple Tables

Because Access 2000 is built on the relational database model, you can create a query that combines information from multiple, related tables. You'll continue to use the Current Product List query in this section, so if you're following along, open the Design view for that query.

The first step in querying multiple tables is to add a reference to the necessary tables to the query's Field List pane. Choose Query, Show Table. The Show Table dialog box appears (see Figure 11.2). To add a reference to a table or an existing query to the current query, simply double-click the item's name in the list box.

For this example, double-click the Suppliers and Categories tables. As you add each table, a line appears between the Product List Field list and the new table's Field list. This line represents the join between the two tables. The Product List and Suppliers lists are joined using the `SupplierID` field present in both tables. For the Categories table, the `CategoryID` field is used. After both tables are added, click Close.

For the supplier information, you're currently interested in the company's name. Double-click the `CompanyName` field in the Suppliers table Field list. The field is added to the QBE grid. For the category information, you're interested in the category name, so double-click `CategoryName` in the Categories table.

The Design View window now appears, as shown in Figure 11.8. When you execute this query, the results appear as shown in Figure 11.9.

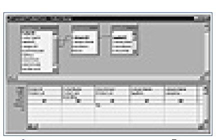

Figure 11.8 The Design View window for the modified Current Product List query.

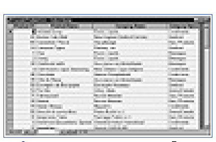

Figure 11.9 The Datasheet View window for the modified Current Product List query.

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Setting Join Properties

As you learned earlier in the section "Using the Field List," when two or more related tables are included in a query, a line appears between the two tables. This line represents the join that exists between the tables.

There is a property you should adjust to match the way in which data is stored in the database. To access this property, double-click the line that joins the two tables or click the line and choose View, Join Properties. The Join Properties dialog box appears, as shown in Figure 11.10.

Figure 11.10 The Join Properties dialog box.

On this dialog, the join whose line you double-clicked will be the join whose properties are displayed when the dialog is displayed. You can choose which join you're setting the properties for by selecting the tables and fields using the list boxes at the top of the dialog. As you can see in Figure 11.10, there are three settings for each join. The default setting is `1: Only include rows where the joined fields from both tables are equal`. This means that the only records that are returned have matching values in the field or fields used to join the two tables. In the modified Current Product List query you created earlier, the only records from the Products table that appear are those in which `CategoryID` and `SupplierID` match a `CategoryID` and `SupplierID` in the Categories and Suppliers table.

In the Products table, however, neither the `SupplierID` nor the `CategoryID` field is required to have values. Leaving the join properties set to the default values causes any records that have no `SupplierID` or `CategoryID` specified to be excluded from the query's output. To always see all the products, regardless of whether or not they have categories and suppliers assigned, set the join property for both joins to the setting that starts with `Include all records from Product List`. This setting specifies that all records from the Products table appear when the query is executed.

Changing the join property causes an arrowhead to be added to the join line, as shown in Figure 11.11. This arrow indicates the direction of the join—from the Products table to the Categories table, for example.

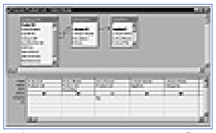

Figure 11.11 The modified Current Product List query with its joins modified.

Working with Properties

Queries and the tables and fields that are used in defining a query, like most objects in Access 2000, have properties that affect their behavior in the query. This section deals with how you can modify these properties.

Query Properties

The properties for the query itself are the most interesting. You can modify the query properties by clicking in the blank area of the Field List pane at the top of the Design View and choosing View, Properties. You also can right-click with the pointer over an empty area of the Field List pane and then choose Properties from the shortcut menu. The Query Properties dialog box appears, as shown in Figure 11.12.

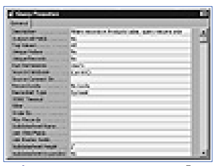

Figure 11.12 The Query Properties dialog box.

Some of the more common properties you can modify in the Query Properties dialog box are

- **`Description:`** Specifies a string to describe the query. Use this property to help you and others remember the purpose of the query. This is the same description you'll see on the Database window's Query tab when in Details view or after you choose Properties from the shortcut menu. If you change a query, you should make sure that the description still matches the query's function and results.
- **`Output All Fields:`** Specifies whether all fields in the grid are shown in the query's datasheet. Setting this property to `Yes` is identical to enabling the Show checkbox for each field in the grid. This property is useful when you want a quick way to display every field in a query with many fields not marked for display.
- **`Unique Values:`** Excludes records with duplicate values in the query's resulting data. This means that only one row with the same values in all the query's fields is displayed in the output. Setting this property to `Yes` enables you to see unique data in each row of the query's result set.
- **`Unique Records:`** Similar to the `Unique Values` property, except that the uniqueness is extended to *all* fields in the table on which the query is based—not just the fields included in the query. In other words, a record is considered a duplicate (and therefore is excluded from the result set) if the value of all fields in the record is a duplicate of another record in the query's result set.
- **`Filter:`** Shows any filter that was created when the query was being viewed in Datasheet view. You create such filters in Datasheet view by choosing Records, Filter. When a filter is applied in this manner, the definition of the filter appears in the `Filter` property in the QBE Grid Design view.
- **`Order By:`** Similar to the `Filter` property because it shows any sorting information used when the query is viewed in Datasheet view. Enter a field name here and the results will be sorted on this field.
- **Subdatasheet Properties:** These properties are used to specify the table or query which should be used for a subdatasheet, if any, that will appear in the Datasheet View. For more information on subdatasheets, refer to Hour 5, "Using the Datasheet View."

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Field Properties

Fields that are displayed in the query's output (their Show checkbox is enabled) also have properties that affect how the data is displayed and edited by the user who executes the query.

To view the properties for a field, select the field in the QBE grid and choose View, Properties. The Field Properties dialog appears, as shown in Figure 11.13.

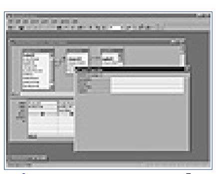

Figure 11.13 The Field Properties dialog box.

Note: Not all the following properties appear in Figure 11.13. The available properties change depending on the data type of the field.

The properties you can modify in the Field Properties dialog box follow:

- **Description:** Provides a description of the field in the query. Again, this should describe the field's purpose in the query. If the query is used as the source for a table, or is displayed in datasheet view, this description will be displayed in the Access status panel when the field has focus.
- **Format:** Specifies the formatting string used to display the data in the field. The edit box has a drop-down list that offers predefined format strings for the data type of the field. If the field is a Numeric field, for example, the Format list box offers numeric format strings; if the field is a Date/Time field, the list box offers date/time-specific format strings.
- **Input Mask:** Specifies the mask used when editing data in the field. This is useful for entering information such as phone numbers or Social Security numbers. The mask defines the format used for these numbers, such as `xxx-xx-xxxx`. This property is available only for fields you can edit. The `ProductID` field is an AutoNumber field that Access automatically fills with data. Therefore, you cannot edit the data in that case, and it has no `Input Mask` property. The `Input Mask` property has a builder that you can invoke by clicking the button that appears to the right of the edit box when it has

focus, or by clicking the Build button on the toolbar when the edit box has focus.

- **Caption:** Specifies the label caption (for forms and reports) or column heading (for Datasheet views) displayed for the field.
- **Decimal Places:** Specifies the number of digits to display to the right of the decimal point (for Numeric fields that aren't integers).

You can use the Lookup tab in the Field Properties dialog box to create a lookup column for displaying and editing the field's data. See Hour 17, "Creating Tables," for more information on creating lookup fields.

Table Properties

Each table represented in the Field List pane also has two properties. You access these properties by clicking in the Field list and choosing View, Properties. The properties you can change in the Table Properties dialog box follow:

- **Alias:** Specifies a user-friendly name for the table or provides a unique name in case the table is used multiple times in the same query. You can set the Alias property to any name not currently used in the database. The Current Product List query has an Alias property value of Product List for the Products table. This causes the heading of the Field list box to read Product List instead of Products.
- **Source:** Used when the table is attached from an external data source, such as an ODBC database or a legacy database system. It specifies the source database and connection string required to access the external data.

Saving Queries

After you make any modifications you want to keep, you must save the query definition. Click the Save button on the toolbar, choose File, Save, or press Ctrl+S.

If you attempt to close the query window without saving your changes, Access asks whether you want to save the modified query. Choose Yes if you want to keep the changes, choose No if you want to discard the changes, and choose Cancel if you want to return to the query window instead of closing it.

Summary

In this hour, you learned a great deal about working with existing queries. You saw how to use the Field List and QBE grid, modify the sort order for the query, and change the criteria used to select the records returned by the query. You also learned about querying multiple tables and setting various properties for the query and its underlying objects.

In the next hour, you'll learn about modifying an existing form.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **When I open the Customers and Suppliers By City using the Design button on the Database window, I'm taken to the SQL View, and the (Grid) Design View toolbar button is unavailable. Why?**

A This query is a union query. Union queries cannot be displayed in the Grid Design View.

Q **Sometimes the Lookup tab on the Field Properties dialog box is empty. What causes this?**

A If you are viewing the field properties for a primary key field of a table used in the query, there will be nothing on the lookup tab. This is due to the fact the primary key values cannot be the source of a lookup column. Foreign key fields (which link to the primary keys of other tables) are the fields to use in lookups.

Quiz

1. Which query field property specifies how data is input into the datasheet view for a specific field?

2. In the Grid Design view, what do the lines that sometimes appear between tables in the table pane represent? Why are there sometimes arrows at the ends of the lines and sometimes not?

3. What are the two ways to limit the results returned when the query is executed?

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Hour 12
Modifying an Existing Form Design

Timothy Buchanan

This hour goes into more detail on forms. Form controls, properties, text boxes, and labels are discussed in this hour. Now that you have a better understanding of forms and their function, you'll learn how to modify forms that already have been designed. The topics covered in this hour include the following:

- Control types
- Text boxes
- Labels
- Advanced controls
- Properties
- The toolbox
- Customizing forms
- Subforms

Note: Controls and properties are the fundamental building blocks of forms and reports. You must understand these concepts before you begin to design and develop forms and reports.

Using Form Controls

A control has several definitions in Access 2000. When I refer to a *control* in this hour, I mean any object on a form; for example, text boxes and labels. Controls provide a way for you to enter values, and the controls display the values. These types of controls are linked to an underlying table or query, but other objects, such as lines or boxes, are also controls. You will learn about controls in Hour 13, "Modifying an Existing Report"; for now, I'll discuss form-specific controls.

Control Types

Many types of controls exist on a form. Some of the most common controls can easily be created with the buttons on the form controls Toolbox. You can see the Toolbox in Figure 12.1.

Figure 12.1 Using the form controls Toolbox.

Note: The basic controls I discuss this hour are labels and text boxes. I briefly discuss a few more advanced controls this hour, including option groups, toggle buttons, check boxes, combo boxes, list boxes, subforms, and graphics controls. You will get into more detail on these advanced controls in Hour 19, “Creating Forms.”

Three basic types of controls exist:

- Bound controls—Controls for which the source of data is a field in a table or query. After you enter a value into a bound control, the corresponding field is updated for the current record in the table or query. Most controls that enable information to be input can be bound controls.
- Unbound controls—Controls that do not have a source of data. These controls retain any values you enter, but do not update any field in the table. You can use these controls to display text, or you can use them as graphics or special effects on the form itself.
- Calculated controls—Controls for which the source is an expression instead of a field in a table or query. These controls are based on expressions or calculations. Calculated controls do not update any table fields, so they are also types of unbound controls. A calculated control can take a purchase price and multiply it by the local tax to get a final total, for example.

Open the Northwind database and double-click the Orders form. This form shows an example of all three types of controls, as shown in Figure 12.2.

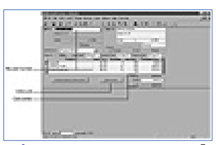

Figure 12.2 Looking at all three basic controls in the Orders form in the Northwind database.

Label Controls

Label controls display descriptive text, such as titles, on forms. Labels can be separate controls, such as when they are used for titles, or they can be linked to the control they are describing. Labels do not accept any input; they are unbound controls. They are like any text because you can format them with any font or point size. You can display labels on single lines or across multiple lines.

Text Box Controls

Text box controls display data or enable the user to enter information. These controls enable you to accept the current data or to edit or delete it. Text boxes accept many kinds of data and can be bound, unbound, or even calculated controls. You will use text box controls more than any other type of control. They are the most powerful and flexible control for forms. Figure 12.3 shows the Customers form from the Northwind database.

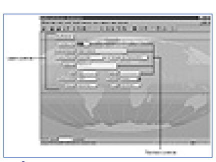

Figure 12.3 Viewing label and text box controls in the Customers form of the Northwind database.

Here, you can see several examples of text boxes.

Each text box should have a label associated with it to describe its purpose. Like labels, text boxes can contain many lines of data or just one line of data. Text boxes have an automatic *word wrap* feature. Any words that are too long to fit in the box automatically wrap to the next line within the field if the text box is big enough to handle extra lines of data. If not, the words scroll to the left as you enter or view them.

Using Advanced Control Types

You can use several other types of controls in forms. This hour briefly explains the advanced types of controls and their basic functions. Hour 19, "Creating Forms," will go into more detail on these controls.

Buttons and Boxes

Fields that have Yes/No data types can use different kinds of controls, known as toggle buttons, option buttons (or radio buttons), and check boxes. Toggle buttons have a sunken or raised button to signify whether a value is True or False. Selected option buttons have a circle with a dot inside, and enabled check boxes are squares with an X in the middle. All three controls provide a way to select one of the Yes/No options, but are visually very different. These controls return a `-1` value to the bound field if the button value is `Yes` and return a `0` value if the button value is `No`. When you design the button, you can select a default value. If no value is entered, the button is displayed as a `null` value, which is the same visual appearance as a `No`.

Note: You can place Yes/No fields in a text box, but the actual contents of that field—a `-1` or `0`—are displayed. It makes more sense and looks better to use a button control.

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Option Groups

Option groups contain several toggle buttons, option buttons, or check boxes. These controls work together instead of separately when they are combined inside an option group. Instead of being used with Yes/No data types only, they can be used to select one option from a selection. Only one option in the group can be selected at one time. Try not to exceed more than four option buttons. If you need more options, it is best to use a list box, which is covered later this hour. Option groups usually are bound to one field or expression. Each button has a different value that it passes back to the bound field if it is selected.

Note: You also can have a group of controls contained in a box, but this box is not an option group. By listing several check boxes—all of which are bound to Yes/No fields—and surrounding them with a box, you allow the user to select more than one option from the list.

List Boxes

List box controls display a list of data similar to a pull-down menu, but the list box always stays open. You can select any of the options by moving the cursor to the desired item and pressing Enter or clicking the item. The value of the item selected is then passed back to the bound field. List boxes have no limit on how many fields or records can be displayed. If more records are available than can be displayed, a vertical scrollbar enables you to browse up and down the list. You usually will use list boxes when you have more than four choices or want the user to be able to view all the choices available.

Note: Combo boxes are another control available to use in forms. Combo boxes initially display a single choice with an arrow next to it that shows all the options available when selected. Combo boxes also enable users to enter information that is not in the list.

Using Control Properties

You use properties to determine the characteristics of the controls or fields on a form or report. Some common properties are `Color`, `Font`, `Size`, or `Name`. You also can use properties to modify certain behaviors of controls, such as whether a control is visible or whether it has a default value. Each control on a form has a list of properties. Even the form itself has its own properties. Figure 12.4 shows the property sheet for the Products form in the Northwind database. To display this sheet, open the Products form. Select the form and click the Properties button on the toolbar, or double-click the control.

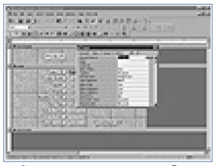

Figure 12.4 The property sheet for the Products form in the Northwind database.

The first column of the property sheet displays the property names. The second column is used to enter the actual properties. The property sheet has numerous properties listed on it. To see all the properties, you must scroll up and down or resize the property sheet. Four tabs on the property sheet enable you to view only certain sections of the property sheet. You can select the tab with the properties that are needed most often, or you can leave the default tab All selected. More about form property sheets will be covered in Hour 19, “Creating Forms.”

You can change any of the properties displayed in the property sheet in various ways. You can enter the desired property directly into the property sheet. You can choose from a list of properties by clicking the down arrow in the property field, if one is available. A button with three dots in it (called the Builder button) might appear next to the property field. You can use the Builder button to build that property. Most properties already have default properties entered.

Customizing Forms

Now that you understand what controls are and what they do in a form, you can learn how to add or change these controls in the Form Design view. In Hour 19, “Creating Forms,” you will learn how to create forms from scratch. For now, you will just concentrate on adding to or changing forms that already exist.

Creating New Controls

If the Products form is not already open in Design view, open the Northwind database and switch to the Forms list. Click on the Products form and then click the Design button to open it in Design view.

You can create a control in one of two ways:

- Drag a field from the field List window to the Form Design window. This creates a bound control.
- Click the toolbox button for the control you want to create and click on the Form Design window. This creates an unbound control.

Note: The toolbox is displayed by default when you are in the Design view of a form. Figure 12.5 shows a toolbox. The toolbox is a quick and easy way to add controls to a form or report. To add a control, click the toolbox icon to select the tool you would like to add. You can click on the form to add an unbound control, or you can click and drag a field from the field list to create a bound control. You can also move the toolbox to a different location and modify it to display different toolbar buttons.

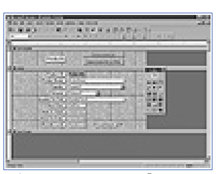

Figure 12.5 The Access form toolbox, which contains all the tools you need to create and edit forms.

Figure 12.6 shows the Field List window. To view this window, click the Field List button on the toolbar or choose View, Field List. The field list shows all the fields in the table or query to which the form is bound. You can move or resize this window.

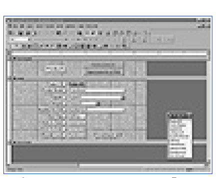

Figure 12.6 The Field List window, with the fields for the Products table displayed.

Note: If you drag fields from the field box windows, the control you create is placed where you click with the mouse button. Make sure that you have room to the left of the control to display the labels.

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Working with Controls

After you have the control on the Form Design window, you can begin to manipulate it. After you click on the Products text box, between four and eight handles appear around the control box, as shown in Figure 12.7. Use the handle in the upper-left corner to move the control. The other handles size the control.

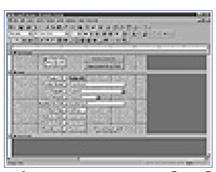

Figure 12.7 The handles for a control enable you to move and resize it.

You can select a single control by clicking anywhere on the control. You know that a control has been selected when the handles appear on the control box. The label also is selected, if there is one. To select multiple controls, hold down the Shift key while clicking all the controls you want to select. You also can drag the mouse pointer around all the controls you want to select.

Aligning and Sizing Controls

If you have several controls on one form, you might want to move some of them to align them. After you select the controls you want to align, choose Format, Align to see several options on how to align your controls (see Figure 12.8).

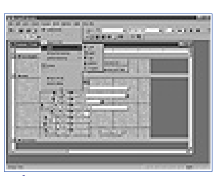

Figure 12.8 Using the menu options to align controls.

Note: To help when you are adding and manually aligning controls, make sure that the Grid is displayed by choosing View, Grid. You can choose Format, Snap to Grid to align all new controls to the grid when you create them. After you turn on this function, you will be able to align controls only to a grid point.

After you choose one of the options in the menu, Access uses the control nearest the selection as the model for the alignment change. You must perform each type of alignment separately.

You can size controls in several ways. Select the controls you want to size, and then choose Format, Size to view the options available (see Figure 12.9).

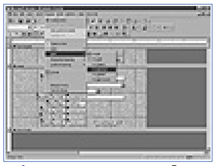

Figure 12.9 The Format, Size menu gives you many options for sizing your controls.

The options you can choose include the following:

- To Fit—Adjusts the height and width of the control to fit the font you have selected for the text
- To Grid—Moves the control box sides to meet the nearest grid points
- To Tallest—Adjusts controls to the same height as the tallest control you have selected
- To Shortest—Adjusts controls to same height as the shortest control you have selected
- To Widest—Adjusts controls to the same width as the widest control you have selected
- To Narrowest—Adjusts controls to the same width as the narrowest control you have selected

Tip: If you no longer need a control on your form, you can delete it by selecting the control and pressing Delete. You also can choose Edit, Delete.

Using Subforms

A *subform* is a form within another form. You can use a subform to display and enter data from multiple tables. A regular form enables you to edit multiple tables, but you need to use a subform if you want to display data from multiple queries or tables at once. Figure 12.10 shows the Orders form from the Northwind database. Notice how the subform enables you to display data from different tables in various formats.

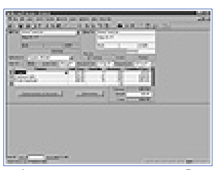

Figure 12.10 The Orders form in the Northwind database with a subform to enable data from the order line-items table to be displayed along with data from the orders table.

The most important feature of subforms is the capability to display one-to-many relationships. The main form displays data from the table on the one side of the relationship, and the subform displays data from the table on the many side.

Note: Subforms are discussed later in the book. For now, take a look at the form in Figure 12.10. Notice that the tables and relationships are linked in this form.

Summary

This hour, you learned more about forms and how to edit some of the controls on a form. The basic control types were explained, and more advanced control types were covered as well. You also learned how to understand properties and customize some aspects of forms. Subforms and their relationship to main forms is an advanced topic, and Hour 19, “Creating Forms,” will explain more about them. You should now be able to open any form you come across and change the appearance to your satisfaction.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you’ve learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What other controls can be used in a form?**

A More advanced controls, such as command buttons, scrollbars, and spin buttons, among many others, can be added to a form.

Q **What other uses does a form have?**

A Forms make wonderful main menus. They also provide security by restricting users from your underlying data.

Quiz

1. What is a control?
2. What do controls do?
3. What is an option group?

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Hour 13
Modifying an Existing Report

Timothy Buchanan

This hour explains the properties and controls of a report and how to modify their design. After this hour, you will know how to modify existing reports and design future reports.

Note: Many of the controls and properties of reports are similar to the controls and properties of a form. Make sure you understand the basics of these elements before completing this hour. You can review the form controls and properties in the previous hour.

The topics covered in this hour are the following:

- Report window
- Report components
- Report properties
- Report controls
- Using expressions in reports
- Special effects in reports

The Report Window

Hour 9, "Displaying Data in Reports," discussed the basic fundamentals of reports. As you remember, there are two main views of reports: Design view and Print Preview. In this hour, you will take a closer look at these different views.

Design View

Click on the Products By Category report in the Northwind database and select the Design View button to open it in Design view. The Design view has several areas. The two main components are the Field list and the Property sheet. These two components work with the report exactly as the Field list and Property sheet work with forms. The Field list contains the fields of the table or query on which the report is based. The Property sheet is where the various report properties can be set and changed. The Toolbox is another important component and is used as an easy way to add various controls and design elements to the report. The report Toolbox has the same tools as the form Toolbox. Figure 13.1 shows the Design view of the Products by Category report from the Northwind database, with the Field list box and Property sheet displayed.

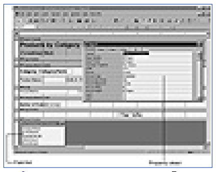

Figure 13.1 The Products by Category report from the Northwind database, in Design view, with the Field list box and Property sheet open.

Print Preview and Layout Preview

When you select the Print Preview view, the report's query is executed (if one exists) and up-to-date information is displayed. If the report is based on a table, the latest information from the table is used. The report is displayed exactly as it will appear when it is printed. A third view, called the Layout Preview, can be selected by clicking the View button on the Design toolbar and selecting Layout Preview. The Layout Preview button can be used only from the Design view. It provides a fast view of the basic layout of the report using sample data. It might not include all the data from the report. This view is useful when the underlying query is complex and it would take a long time to preview the report in the normal way. The Layout Preview of the Products by Category report is shown in Figure 13.2.

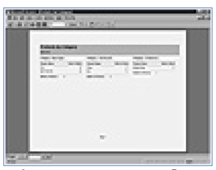

Figure 13.2 The Products by Category report from the Northwind database is shown in Layout Preview.

The Report Components

Reports consist of several different sections:

- The report header is the main header of the report. It is printed only once, at the beginning of the report. It is normally used as the title of the report. The Products by Category report uses the report header to show the title of the report and the current date.
- The page header contains information (such as page numbers or column titles) that is printed at the top of every page. The Products by Category report does not use the page header. Other reports use the page header for graphics such as lines or boxes to be printed at the top of every page.
- Group headers (not used by all reports) contain data that is printed at the beginning of each new group of data on a report. This option can be set up by changing the `Group Header` property in the Grouping dialog box to `Yes`. The Products by Category report is grouped by the `CategoryName` field. Refer to Figure 13.1. The header "CategoryName Header" is a group header.
- The detail section is the main section of the report. The data contained in the detail section is printed for each record in the underlying table. The Products by Category report lists the product name and the number of units.
- Group footers (not used in every report) contain data that is printed at the end of each new group of data on your report. Usually the information in this section will be summary information, such as subtotals. This option can be set up by changing the `Group Footer` property in the Grouping dialog box to `Yes`. On the design screen, this footer will be named after the Field name that is being grouped. In the Products by Category report, the report is being grouped by the `CategoryName` field, and the name of the Group footer is "CategoryName Footer."
- The page footer contains information that is printed at the bottom of every page, usually page numbers, page totals, or the current date. The Products by Category report uses the page footer to display the page number.
- The report footer is the main footer of the report. It is printed only once, at the end of the report, and

is usually used for summary information. The Products by Category report does not use the report footer.

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Report Properties

Reports, similar to forms, have certain properties that determine elements of the report. Each section of the report has properties, as does the report as a whole. Figure 13.3 shows the property sheet enlarged and displayed for the Products by Category report. To display the property sheet, either click the Properties button on the toolbar, or right-click the mouse anywhere on the screen and select the Properties icon.

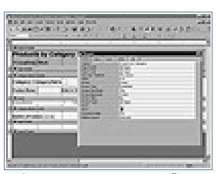

Figure 13.3 The Products by Category report from the Northwind database, with the Property Sheet displayed.

To display the property sheet for a certain section, double-click the section itself and the property sheet for that section automatically opens. If the property sheet is already open, it will display the properties for the currently active section. To display the property sheet for the whole report, double-click the gray area outside of any report section or the box where the rulers meet in the upper-left corner. The property sheet will be displayed now.

Changing any of the properties is as easy as clicking the property you want to change and typing in a new value. When you click the property you want to change, a down arrow sometimes appears. This indicates there are more options for that property. Otherwise, you can type in any value. The properties are divided into five categories and are listed under five tabs in the property sheet:

- Format properties determine the appearance characteristics of the report, such as width, palette source (color), and whether any pictures or graphics are included (see Figure 13.4).

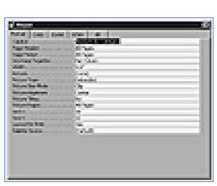

Figure 13.4 The Products by Category report from the Northwind database, with the Property Sheet displayed and the Format properties tab selected.

- Data properties determine the characteristics of the data displayed in the report, such as the record source, filter, and order of data. This is shown in Figure 13.5.

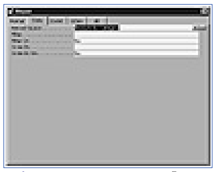

Figure 13.5 The Products by Category report from the Northwind database, with the Property Sheet displayed and the Data properties tab selected.

- Event properties enable you to run macros when certain events occur, such as when particular keys are pressed or when certain areas of the report are clicked. This is shown in Figure 13.6. Macros help automate repetitive tasks without requiring you to write complex code or learn a programming language. You will be introduced to macros in Hour 21, “Creating Macros.”

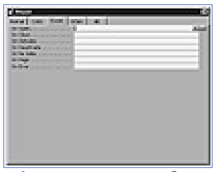

Figure 13.6 The Products by Category report from the Northwind database, with the Property Sheet displayed and the Event properties tab selected.

- Other properties display characteristics of the report, such as record locks and date grouping. This is shown in Figure 13.7.

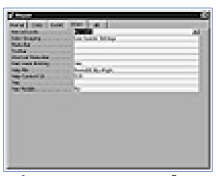

Figure 13.7 The Products by Category report from the Northwind database, with the Property Sheet displayed and the Other properties tab selected.

- All properties displays all the properties from all the previous tabs of the section or report (see Figure 13.8).

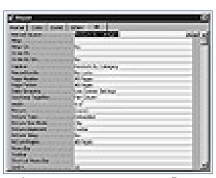

Figure 13.8 The Products by Category report from the Northwind database, with the Property Sheet displayed and the All properties tab selected.

Common Report Properties

Many of the report properties are never changed. Many others can be changed easily and are important to use to create interesting and useful reports. Some of the more important properties are as follows:

- The `record source` property specifies the default table or query on which the report is based. This property is already set up for you when you use a wizard to create your report; you can set it yourself when creating reports from scratch.
- The `caption` property is listed in the Report’s property sheet. It specifies the name that appears in the title bar when you view the report in Print Preview.
- The `picture` property determines whether any picture or graphic is displayed in the report, or in any of the sections.
- The `format` property, when used on controls involving numbers, determines in what format the number is displayed. Some of the formats are currency, time, date, integer, standard, and percent.

Note: Changing a control's `format` property does not change the data in the underlying table. For instance, if the number in the table is 12,972.4556, it could be displayed as $12,972.46 if the format is set to currency. The number is still 12,972.4556 in the table, but is displayed as $12,972 in the report.

Using Expressions in Reports

Expressions are used to calculate values for certain fields on a report and to calculate mathematical and statistical values. Expressions can calculate numerical values as well as text values. Text values from multiple text fields can be combined to form one text field on a report. Expressions in reports are used the same way as in forms. Expressions in forms are covered in Hour 12, "Modifying an Existing Form Design." Some additional expression types are covered in this hour.

Date Expressions

Access provides an easy way to find out on what date a report was printed. Access has two ways to display dates: the `Now` function and the `Date` function. `Now` displays the current time and date stored on your computer. `Date` displays the current date. These values can be formatted to any of the time and date formats available in the property sheet. The Products by Category report has the current date in the report header, which is shown in Figure 13.9. To add the current date to a control on your report, add an unbound text box to your report. In the Control source section of the report's property sheet, or in the text box, type in the value `=date()`.

Figure 13.9 The Products by Category report from the Northwind database displays the current date in the report header.

Note: The Products by Category report has a more complex version of the `Date` function. The date is displayed with the `Format` function, which tells Access to display the current date as well as what format to use to display the date. (See Figure 13.10.) You can add `=date()` to the control source and then change the `Format` property to the desired date format. The Products by Category report uses the following code to display the date:

```
=Format(Date(),"dd-mm-yyyy")
```

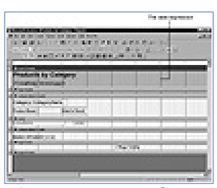

Figure 13.10 The Products by Category report from the Northwind database uses the *`Format`* and *`Date`* functions to display the current date in the Report Header.

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Page Numbers

Page numbers help organize printed reports. Usually you have the page number in the page header or page footer of the report. Use the `Page` function to add the page numbers. The `Page` function automatically adds the page numbers when you preview or print the report. The Products by Category report displays the page number at the bottom of each page. (See Figure 13.11.) Add the `Page` function to an unbound text box the same way you add a date. In an unbound text box, change the Control Source text property to `=[Page]`. This will print only the actual page number. To add the word Page before the page number, use an expression like `="Page " &[Page]`. This evaluates to the word `Page`, a space, and then the page number. This is the format that the Products by Category report uses. Figure 13.12 shows the property sheet used to display the page number.

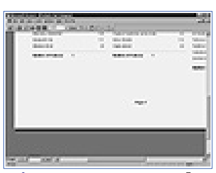

Figure 13.11 The Products by Category form in the Northwind database displays the page number at the bottom of each page.

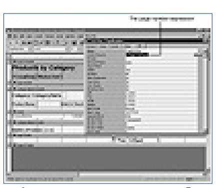

Figure 13.12 The Products by Category form in the Northwind database uses the `Page` function in an unbound text box to display the page number at the bottom of each page.

Using Graphics in Reports

You can add graphics to reports. Open the Catalog report in the Northwind database, in Preview. The first screen you see has the Northwind logo displayed, as shown in Figure 13.13. If you take a look at the design view of the Catalog report, you see that the logo is added to the report in the report header. Most image formats are usable by Access.

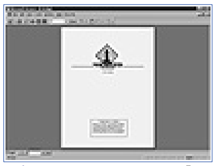

Figure 13.13 The Catalog report from the Northwind database uses an image of a logo on the report.

Summary

This hour explains the properties and controls of a report and ways to modify their designs. It also discusses the report window and report components, as well as the report properties, report controls, and their similarities to form properties and controls. It also covers how to use expressions and some special effects.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What other types of properties does a report have that can be changed to make the report work better?**

A Some other important properties that you can use are the `Views Allowed` property (which lets you choose what views the user will be able to use to view the report), `Allow Edits` (which lets you choose if the user will be allowed to change the report), and `Navigation Buttons` (which lets you choose to add the regular navigation buttons to the report—or leave them out). There are many more properties that you can use to perfect your report.

Q **What other types of expressions can I add to my reports?**

A There are dozens of different expressions and functions, but a couple that are helpful return the current month, hour, minute, and even the current second or the current user. You can also use expressions to display a message to the user.

Quiz

1. What are the two main views of reports?
2. What database objects do reports display information for?
3. What sections make up a report?

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Part IV
Creating a Database Using Wizards

Hour 14
Creating a Database Using Wizards

Craig Eddy

In the previous section of this book you learned all about using the components of an existing Access database. Now it’s time to create your own databases. The two hours you’ll spend in this section discuss using Access 2000’s Wizards to build and extend a new database.

This hour covers creating a new database using the Database Wizard and the Table Wizard. The Database Wizard creates an entire database for you. It can even populate the new database with sample data if you’d like. The Table Wizard aids you in adding a new table to an existing database, including relating that new table to existing tables. Before you create a new database, however, you should do some up-front planning, which is the first topic discussed in this hour.

The topics covered in this hour include:

- Planning your database.
- Using the Database Wizard to create a new database.
- Using the Table Wizard to add tables to a database.
- Using the Table Analyzer Wizard to make your tables more efficient.

Planning a Simple Database

The first step in creating a database is to plan your work. This involves deciding which of the Access database components will be included in your new database. That is, will it have tables, queries, forms, reports, or data access pages? After you have decided which components you'll use, you must then decide the specifics of these components. How many tables will you require? What will the forms be used for? And so on.

The most important thing is deciding what the tables in your new database will look like. You should create a simple database model to map out your tables before you begin to do any other work with your new database. Even a very simple model will go a long way toward making sure that nothing falls through the cracks. It is much harder to add components to your database at a later date and keep everything working properly than it is to get your database's structure right the first time around.

New Term A *database model* is a design document that describes the tables in a database. The model specifies which tables (also called entities) are included in the database, what the fields (sometimes referred to as attributes) in those tables are, and what relationships exist between the tables.

For now, a simple database model done with pen and paper will suffice. More details about database design are left for an hour by itself. You'll find that in Hour 16, "Planning and Designing Your Database."

First, decide what data you are going to store in the database. Break this data into an organized fashion by grouping the different attributes of the data. For example, to create a home inventory database, you should have a table that contains the rooms in the home. Each room stored in the table has specific attributes: Name, Floor (first, second, basement, and so on), and so forth. You also would like a table to store the items found in each room. The attributes for an item might include Description, Room, Cost, Replacement Value, Insurance Coverage, Place of Purchase, and so on. Each of these attributes would become a field in one of the tables. You would also define a primary key field for each table. This is simply an identifier field that enables Access to uniquely identify an individual room or item, regardless of the other data stored about the room or item.

You would also note that there is a relationship between Rooms and Items: each item has a reference to a specific room. This relationship should be noted on your database model by drawing a line between the primary key of the Rooms table and the `Room` field in the Items table (see Figure 14.1).

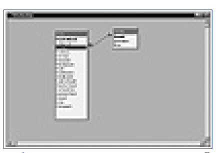

Figure 14.1 A relationship between two tables is illustrated by drawing a line between the matching field or fields from the tables.

After your simple model is completed, you can proceed to create your database. You can use the Database Wizard described in the next section, or you might create a blank database and then use the Table Wizard described later in this hour to add your tables to the empty database.

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Using the Database Wizard

Now that you know the basics of planning your new database, it’s time to actually create one. The simplest and quickest way to create a database in Access 2000 is to use the Database Wizard. This will create a new database, complete with the tables, forms, queries, and reports for a database style that you choose. You can then add to the database other elements that your data model included but the wizard did not create. Or, you can remove those items the wizard created but that aren’t in your data model.

You can launch the Database Wizard in one of two ways. First, in the initial dialog box that appears when you launch Access, you can select the Access Database Wizards, Pages, and Projects option button. Second, if you’ve already opened an Access database, you can use the File, New menu item. On the New dialog box that appears, select the Databases tab.

To use the Database Wizard, follow these steps:

1. Figure 14.2 shows the Databases tab of the New window. Here you choose the template for your database. Using the data model you created in the previous section, choose the database template that seems to most closely match your data model. After you’ve chosen the appropriate template, click the OK button to move on.

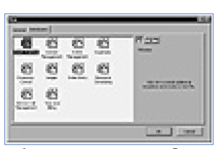

Figure 14.2 The Database Wizard template selection dialog box.

2. The first of the Wizard’s dialog boxes, which is shown in Figure 14.3, is where you choose a location and filename for the new database. Use the dialog box just like the typical Save As dialog box you’ll find throughout the Office 2000 suite. Select the folder into which you would like the database to be created and give it an appropriate name. Click the Create button to continue.

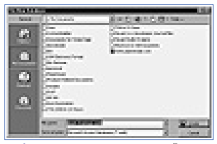
Figure 14.3 The File New Database dialog box.

3. The next dialog box provides you with some information about the purpose of the database being created. Click the Next button to move on.

4. In the dialog box shown in Figure 14.4, you have the chance to add some suggested fields to the database. These additional fields are not required, but the Database Wizard provides them so that you can customize the new database to more closely match your data model. After you've customized the fields, click Next to continue.

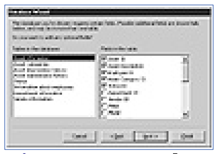
Figure 14.4 The Additional Fields/Sample Data dialog box.

5. The next dialog box, shown in Figure 14.5, enables you to pick a style for the display elements of the new database. The style even includes such things as background graphics for forms. The picture box on the left side of the dialog box shows a preview of the selected style. Select a style from the list and click Next.


Figure 14.5 The Screen Displays Style dialog box.

6. You should now see the Report Displays dialog box. Similar to the Screen Displays Style dialog box, this enables you to choose a style for the reports. Choose a style and click Next.

7. The next dialog box, shown in Figure 14.6, enables you to specify a title for the database. There is also a check box for choosing whether to display a graphic on the printed reports. If you check this box, the Picture button will be enabled. Clicking the Picture button opens a dialog box that enables you to select the graphic file to be displayed on the reports.

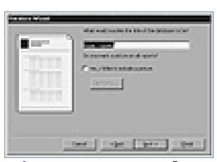
Figure 14.6 The Database Title and Report Graphic dialog box.

8. Click Next to move to the final dialog box. Here you choose whether or not to start the new database when you're finished, as well as whether to display some extended help on using a database. If you leave the Yes, Start the Database check box checked, the database's Switchboard form (which is created by the wizard and provides buttons to use in navigating the other forms in the database) will be displayed when you click Finish. Otherwise, you'll be taken straight to the Database window. Choose accordingly and click Finish.

After you click Finish, the Database Wizard goes to work. As it creates your database, the wizard displays a progress dialog box showing you what elements it's currently creating. This dialog box contains two progress bars, one for the entire database, and one for the current element being created. This enables you to gauge the progress of the database creation. When the wizard finishes, you'll have a complete, working database.

Congratulations! You've just created an entire database!

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Using the Table Wizard

Access 2000 contains a wizard even more useful than the Database Wizard: the Table Wizard. This wizard assists you in creating a new table for an existing Access database. You'll pick and choose from a variety of templates to create a table that can exactly model the data you add to the database. In my examples, I'm adding a table to the database I created in the previous section.

To use the Table Wizard, follow these steps:

1. Either start a new blank database or open an existing database. Select the Tables section on the Database window. Next, double-click the Create table by using wizard entry in the Tables list. Alternatively, you can click the New button and, on the New Table dialog box that appears, select Table Wizard and click OK.

2. The first screen of the Table Wizard appears, as shown in Figure 14.7. Here you select the type of table to be created, either business or personal, by using the radio buttons at the top left of the dialog box. Next choose a sample table in the list box at the far left. Choosing a different table will cause the list of sample fields to change.

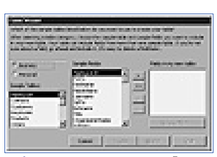

Figure 14.7 The Table Wizard's initial dialog box.

3. From the list of sample fields, select the fields you'll need in your new table and click the > button. You can add fields from different sample tables by choosing the desired fields from one sample table and then selecting a different table and choosing fields from that one. The fields displayed in the Fields in My New Table list stay even if you change to a different sample table. To remove a field from this list, select the field and click the < button. You can remove all fields by clicking the << button.

You can also rename a field if you want. To do so, select the field in the list box labeled Fields in my new table and click the Rename Field button. An input box will appear where you can edit the field's name.

Figure 14.8 shows the wizard after I've chosen the fields I want to add to my new table. Note that I used the Transactions sample table. I changed the `AccountID` field name to `AssetID`.

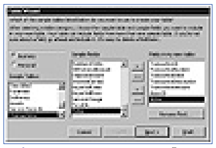

Figure 14.8 The Table Wizard's initial dialog box for the Transactions table.

When you've chosen the necessary fields, click the Next button to move on.

4. The next dialog box is where you'll specify the name for the new table as well as tell the wizard whether to choose a primary key for the table. I'm naming the new table Transactions, so I'll leave the suggested name as-is. Also, it's a good idea to let Access choose a primary key. Because I've included the `TransactionID` field, Access will probably choose that one (you'll see in a bit whether or not this guess is correct). Click Next to move on after you've filled in this screen appropriately.

5. The next dialog box, shown in Figure 14.9, is where you define any relationships that exist between the new table and existing tables (this dialog only appears if there are other tables in the database already). Access has already guessed that the transactions are related to an asset through the `AssetID` field. This is signified by the Related to 'Assets' entry in the list box on the Relationships dialog box.

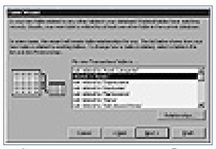

Figure 14.9 The Table Relationship dialog box.

If you want to change a particular relationship, select its entry in the list box and click the Relationships button. The Relationships dialog box shown in Figure 14.10 appears. Here you can specify the type of relationship that exists between these two tables. Hour 16 describes table relationships in more detail. Close the Relationships dialog box, if you've opened it, and click Next to continue.

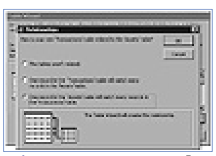

Figure 14.10 The Relationships dialog box.

6. The final dialog box of the Table Wizard has three option buttons: Modify the Table Design, Enter Data Directly into the Table, and Enter Data into the Table Using a Form the Wizard Creates for Me. Choose which option you'd like to pursue and click Finish.

Congratulations! You've added a whole new table to your database! Open the new table in Design view and verify that Access has chosen the `TransactionID` field as the primary key.

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The Table Analyzer Wizard

Now that you've seen how to use wizards to create databases as well as to add tables to a database, let's take a look at another useful wizard. The Table Analyzer Wizard removes repeating information from a table.

For example, you might have a table containing business contacts. This table could include information about the contact's employer. But suppose you had more than one contact working for the same company. The company information in each contact's record will be what's known as repeating information. This presents several possible problems:

- Wasted space. Any time you duplicate information in a database, you're wasting space.
- Data entry mistakes. Each time you enter data into a new record, you run the risk of entering it incorrectly.
- Updates made more difficult. If, for example, the company changes its phone number, you'll have to change it in the record of each contact that works for the company.

These are three compelling reasons to avoid or eliminate repeating information. As you'll see in Hour 16, a properly designed relational database does not contain repeating information. The Table Analyzer Wizard helps you eliminate repeating information by separating the fields containing the repeated information into a new table. The existing table will be left intact; the Wizard will create at least two new tables.

To use the Table Analyzer Wizard, follow these steps:

1. Open the database containing the table with repeating information. One of the Wizard's dialog boxes will enable you to choose which table to analyze so you don't have to select it ahead of time. In fact, if you have the table to be analyzed open in Design view, you need to close the Design view window before proceeding.

2. Click on the Tools menu and then click the Analyze flyout menu. Finally, click the Table item. Alternatively, if the Database window is the active window, you can click the Analyze button on the toolbar (see Figure 14.11 for the location of this button). The first dialog box of the Table Analyzer Wizard, shown in Figure 14.11, appears.

Figure 14.11 The first dialog box of the Table Analyzer Wizard.

3. This dialog box explains the problems caused by repeated information. You can click on the Show Me an Example buttons to get even more details. When you're ready, click the Next button to move on.

4. The next dialog box explains how Access will solve the problem. Again, you can click on the Show me an example buttons to get more information about the explanation. Click Next to continue.

5. In the dialog box that appears next, you select which table the Wizard will analyze (see Figure 14.12). You can also turn off the two introductory dialog boxes by unchecking the Show Introductory Pages? check box. Select the table you want analyzed and click Next.

Figure 14.12 The table selection dialog box of the Table Analyzer Wizard.

6. In this dialog box you choose whether you or the Wizard will decide how to break up the repeated information. If you're sure of how to split the table, select No, I Want to Decide and click Next. To let the Wizard do the work, select Yes, Let the Wizard Decide. Make your choice and click Next.

Note: In order for the Wizard to do its work of deciding how to split your table, there must be enough data for it to analyze. In other words, make sure there's data in the table that actually demonstrates a repeating tendency. If there are not at least two rows in the table, the Wizard will inform you that you'll have to split the table manually.

---

7. If you choose to split the table yourself, your next dialog box will be the one shown in Figure 14.13. The wizard has already created a new table (that's a copy of the original) and given it a default name. Remember, the wizard leaves your original table as-is. It's creating a new table that's a copy of the original but without the repeating information. To change the name, click the Rename Table button and enter the new name when prompted.

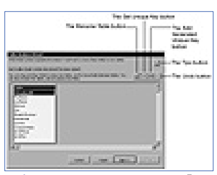

Figure 14.13 The work area for the Table Analyzer Wizard, where you decide which fields to move to the new table.

In Figure 14.13 you see a table named Table1 that contains a `CompanyName`, a `WorkPhone`, and a `WorkFax` field. These are the repeated information fields in this table. To split these fields into a new table that will be used as a lookup table, first click the `CompanyName` field, and then hold down the Ctrl key and click the `WorkPhone` and `WorkFax` fields. Next click one of these fields again and drag them over the blank area of the dialog box's work space. Drop them there to create a new table.

8. Access prompts you for a name for your new table. Enter an appropriate name and click OK. You cannot duplicate the name of another table, so enter a unique table name. Figure 14.14 shows how the workspace looks after all this. Click the Next button to continue.

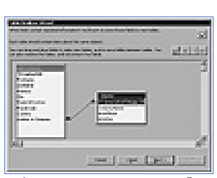

Figure 14.14 The updated work area after selecting the fields to move to the new table.

9. After the Wizard has finished splitting your table, it displays the dialog box shown in Figure 14.15. Here the Wizard is giving you the capability to replace the original table with a query that behaves just as if it were the original table. This enables any forms, queries, and reports that reference the original table to keep working without modification. The original table will be renamed with the suffix _OLD so as not to conflict with this new query. If you want to proceed with the new query, leave the default option button selected. Otherwise, click on No, Don't Create the Query. Click Finish to create your new tables and query (if selected).

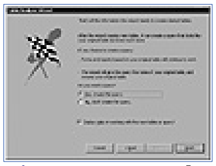

Figure 14.15 The final dialog box of the Table Analyzer Wizard.

Summary

In this hour you learned the basics of creating and adding tables to a database. With what you learned in just this one hour, you can create and extend usable Access 2000 databases in a short period of time. The next hour, "Adding to a Database Using Wizards," will discuss other wizards Access provides for adding forms, queries, and reports to your database.

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Workshop

This section contains a questions and answers section and Quiz to test your knowledge of queries. The Quiz answers are contained in Appendix A, "Quiz Answers."

Q&A

Q **Can I create my own wizards?**

A Yes. Using Access 2000's Visual Basic for Applications, you can create wizards to be included and distributed with your Access database. A good reference on this topic is Sams Publishing's *Microsoft Access 2000 Unleashed*.

Q **Is a data model really necessary? Can't I just start adding tables to my database until I've completed it?**

A In my opinion, a data model is necessary before you begin. It will serve as a road map, guiding your path as you create your database. Without it, you might get lost or sidetracked. At the very least, create a simple model of the major elements in your database.

Quiz

1. What is a data model?
2. For which elements can you specify a style when creating a database using the Database Wizard?
3. When creating a table using the Table Wizard, are you stuck with the field names in the wizard's template?

KEYWORD SEARCH
GO!
Search Tips
Advanced Search
PUBLICATION LOOKUP
GO!
Title
JUMP TO TOPIC

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Hour 15
Adding Additional Components to a Database Using Wizards

Timothy Buchanan

In this hour, you'll learn about wizards. Wizards automate the creation of objects such as forms or reports. All the objects in an Access database can be created from scratch, but this can be time-consuming and repetitive, so Access 2000 includes several wizards to make your job easier. You can create most of the objects in Access using wizards. You can even create complete, ready-to-run databases by using a Database Wizard.

The topics covered in this hour follow:

- Creating new tables with the Table Wizard
- Tuning your tables with the Table Analyzing Wizard
- Creating new forms with the Form Wizard
- Creating new queries with the Query Wizard
- Creating new reports with the Report Wizards
- Quickly creating new databases with the Database Wizards

Using the Table Wizard

You use the Table Wizard to create a new table. After you click New in the Database window with the Table tab selected, Access displays the New Table dialog box, as shown in Figure 15.1. Select the Table Wizard and click OK to load the Table Wizard and display the Table Wizard dialog box, as shown in Figure 15.2. You can also double-click the selection in the Table list entitled Create Table by Using Wizard. The first Table Wizard dialog box has three sections. Use the left-most section to choose from a selection of sample tables. There are different tables for business use and personal use. After you select the sample table on which you will base your new table, you can choose from a number of sample fields for that particular table. Each sample table has different sample fields. By clicking the arrow buttons on the dialog box, you can select the sample fields you want to include in your table. You can rename the fields now, or you can rename them later in Design view. After you select the fields you want to use in your table, click Next.

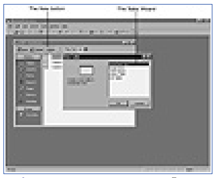

Figure 15.1 The New Table dialog box.

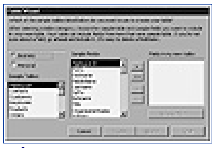

Figure 15.2 Deciding to base your new table on one of many business and personal tables.

The next dialog box asks you what you want to name your new table (see Figure 15.3). You also can have the Table Wizard set the primary key, or you can set it yourself. After you name your table, decide on the primary key and click Next. The Table Wizard displays the dialog box shown in Figure 15.4. Here, you are asked about the relationships between your table and any other tables in your database. You can make changes to the relationships in this box, or you can change them later. Click Next when you are finished with this screen, and the Table Wizard tells you that it has all the information it needs to create your table.

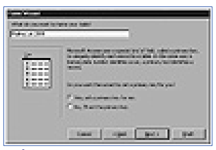

Figure 15.3 Naming your table.

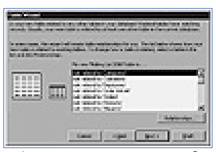

Figure 15.4 Defining table relationships.

Now the wizard creates your table and gives you a choice of what you would like to do next, as shown in Figure 15.5. The default choice is to open the table in Datasheet view and enter data directly into the table. You also can choose to open the table in Design view and modify the design, or let the Wizard create a form to use for data entry and enter data into the table using this new form. Click Finish to continue after you make your choice. Your new table then opens in the view you selected. After you make any changes, save the table. It then is listed on the Tables list on the main database screen with the other tables in the database.

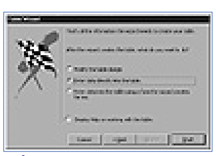

Figure 15.5 Deciding to modify your table design, enter your data directly, or enter the data using a table created by the wizard.

Using the Form Wizard

You use the Form Wizard to simplify the layout process of a new form. Using the Form Wizard is a quick and easy way to create a new form that is bound to a table. The Form Wizard visually walks you through the form-creation process, asking you questions about the form you want to create. These questions include what type of form you want and where the data will be located in your database. The Form Wizard then creates the form. You can use the form immediately, or you can make any changes to get the form to look exactly the way you want.

To create a new form by using the Form Wizard, select the Forms tab in the Database window and click New. You can also double-click the selection in the Form list titled Create Form by Using Wizard. The New Form dialog box appears, as shown in Figure 15.6. Select the Form Wizard in the upper-right box, and choose the table or query that has the information you want to display on the form. Click OK to continue.

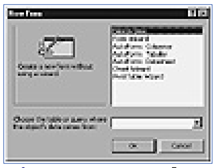

Figure 15.6 The New Form dialog box.

The next Form Wizard dialog box asks you to select which fields from the table or query you want to place on the form. Figure 15.7 shows this dialog box with the Customers table selected and all the fields added to the new form. By clicking the arrow buttons, you can add one field at a time, or you can click the double arrow button to select and move all the fields. After you select the fields, click Next to continue.

Figure 15.7 Specifying which fields to display on the form.

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The next Form Wizard dialog box asks you to choose which layout you want for your new form. The default form is a Columnar form, as Figure 15.8 shows. Your other choices are Tabular, Datasheet, and Justified. After you select each option, the left half of the box shows a sample of that layout. Choose your layout and click Next to continue.

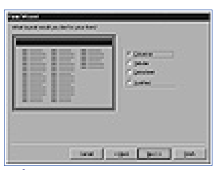

Figure 15.8 Specifying which layout the form will use to display data.

The Form Wizard next displays a dialog box that enables you to choose what style to use for the form. The style controls the color and font used to display the data, as well as other formatting options, such as a background picture. The default choice is Standard (see Figure 15.9). Choose your style option and click Next to continue.

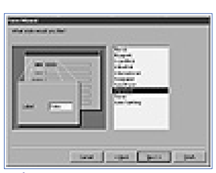

Figure 15.9 Specifying the style the form uses to format the data it displays.

Figure 15.10 shows the last Form Wizard dialog box. Here, you can choose a name for your new form. You also can choose what to do after the form is created. You can open the form in View mode and begin entering data, or you can open the form in Design mode and make any changes you need. In Design mode you can change any of the options you chose in the Form Wizard dialog boxes. Name your form, choose how you want to open the form, and click Finish. The Form Wizard creates the form for you and opens it in the view you selected. You can also select the Help button from many of the wizard menus. These Help options give you help on other ways to work with your data.

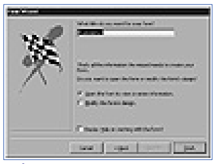

Figure 15.10 Naming the form and choosing the view in which to open the form.

Figure 15.11 shows the completed form. You could have created this form from scratch, but using the Form Wizard is much easier and quicker.

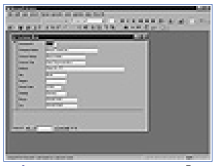

Figure 15.11 The form created using the Form Wizard is based on the Customers table.

Using AutoForm to Create a Form

You can create a simple form instantly by using the AutoForm feature. AutoForm creates a new form that displays all the fields and records from the selected table or query. Each field from the table appears on the form on a separate line with a label to its left. You can use AutoForm by clicking the New Object button on the toolbar and choosing the `AutoForm` icon. AutoForm creates single-column, tabular, and datasheet forms.

Using Query Wizards

Access has four Query Wizards to help you easily create a query: the Simple Query Wizard, the Crosstab Query Wizard, the Find Duplicates Query Wizard, and the Find Unmatched Query Wizard.

The Simple Query Wizard

You use the Simple Query Wizard to create a simple query. This wizard is very easy to use. The queries created by using this wizard are not as powerful as queries created in Design view using QBE, however. This type of wizard is fine for queries that use only one table because it simply enables you to choose which fields are included in the resulting query.

The Crosstab Query Wizard

You use the Crosstab Query Wizard to create a crosstab query quickly and easily. Crosstab queries display summary data in cross-tabular form, similar to a spreadsheet. The row and column headings are based on fields in the table. The individual cells in the dynaset created by this query are tabular—in other words, computed or calculated.

The Find Duplicates Query Wizard

You use the Find Duplicates Query Wizard to create a Find Duplicates query. Find Duplicates queries show any duplicate records in a single table, using fields in the table as a basis. This wizard asks which field or fields you want to use to check for duplication and then asks you what other fields you want to view in the query. This type of query helps you find duplicate data in your database, such as duplicate-key violations. Finding duplicate-key violations is helpful if you have an existing table without a unique primary key field and you want to designate one field as the unique primary key but are not sure whether any duplicates exist. Using this type of query, you can check the field to make sure that no duplicates exist that could cause problems.

The Find Unmatched Query Wizard

You use the Find Unmatched Query Wizard to create a Find Unmatched query. This type of query shows all records in a table that do not have a corresponding record in another table. Some of these records, called *orphan records*, are records on the many side of a relationship, and they have no records on the corresponding one side. Other records, called *widow records*, are records on the one side of a one-to-many or one-to-one side of a relationship that do not have corresponding records in another table. Using this type of query, you can easily find records that may be causing errors when you try to set relationships and enforce referential integrity.

Using Report Wizards

Access provides many kinds of reports you can use in your database. Some reports are very easy to create, whereas others can be tedious and time-consuming. Report Wizards supply a very easy way to create any kind of report, and they are great tools for those more complicated reports. You can use Report Wizards for these types of reports: single-column, group/totals, mailing label, summary, tabular, auto, and Microsoft Word mail merge. To create a report using the Report Wizards, select the Report tab from the main database screen and click the New button. Select the Report Wizard from the selections on the first menu and select what table or query to base the report on. The Report Wizards help you lay out the fields by asking you questions about the type of report you want to create and other information needed for the report. The wizard then creates the report for you.

Using AutoReport to Create a Report

Similarly to using Autoform to automatically create a new form, you can create a simple new report instantly by using the AutoReport feature. AutoReport creates a new report that displays all the fields and records from the selected table or query. Each field from the table appears on the form on a separate line with a label to its left. You can use AutoReport by clicking the New Object button on the toolbar and clicking the `AutoReport` icon. AutoReport creates single-column or tabular reports. Although AutoReport is the easiest and quickest way to create a report, you usually want more control over the design of your report. You can use AutoReport to add all the fields to a report and then customize it to your specifications.

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Using Database Wizards

Database Wizards provide an easy way to create new databases based on pre-programmed database templates. Access 2000 actually combines the features of the other wizards with a tool that creates complete applications, called an *application generator*. When you run the Database Wizard, it creates a complete, customizable database application. You choose which fields you require from the table definitions for the database you selected, and Access creates a ready-to-run application for you. To run the Database Wizard, choose File, New…. A New dialog box similar to the one shown in Figure 15.12 appears. Each icon represents a different application that the Database Wizard can create. You can choose from more than 22 applications, including the following:

Asset Tracking	Service Call Management
Order Entry	Expenses
Contact Management	Time and Billing
Resource Scheduling	Inventory Control
Event Management	Ledger

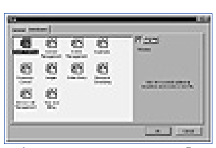

Figure 15.12 The New dialog box has 10 database templates.

After you choose which application is similar to the one you want to create, double-click its icon to begin defining your new application. The Database Wizard first displays the File New Database dialog box, as shown in Figure 15.13. Here, you name your new database and specify where you want to store it. Once it is created, you can change any of the objects to develop your own unique database, without having to manually create all of the tables and other database objects.

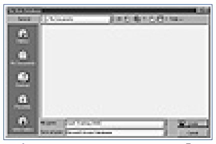

Figure 15.13 The New Database dialog box asks you to name the new database and specify where to save the database file.

Note: The different database templates you can use are not only very easy and quick ways to create powerful and useful databases, but they can be great learning tools as well. Create a few of these databases and take a look at how they are designed and what features they use to create great-looking, user-friendly databases.

Summary

This hour goes into more detail about wizards. Access 2000 includes several wizards that make it easy to create many different objects. You learned about Table, Form, Query, Report, and Database Wizards in this hour. You looked at many examples of how wizards can be used. Wizards can help you to create many different database objects.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **Can I create my own wizards?**

A Yes, Access 2000 gives you the tools to create your own wizards.

Q **Can I change any of the wizards?**

A Yes, you can change the existing wizards, but that is something best left to an expert programmer.

Quiz

1. Why should you use wizards?
2. Why should you use the Table Analyzer Wizard?
3. What query wizards are available?
4. How many database wizards are there that create complete, new databases?

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Part V
Creating a Database from Scratch

Hour 16
Planning and Designing Your Database

Craig Eddy

Up until Part IV of this book, you dealt with databases that already existed. In Part IV, you learned about creating and extending databases using Access 2000's many wizards. This section explains how to manually create a database from scratch. The topics covered in this hour include

- The basics of relational databases, including some definitions of relational database terms.
- The three types of table keys and three types of indexes.
- The steps typically followed in the design of a relational database.

The first step in creating any database is to plan the database carefully. This is especially important when you're designing a relational database such as the ones which you can create and view with Access 2000. In fact, having a good design is the single most important factor in creating an effective database. The design must be flexible, logical, and methodical. By the time you finish this hour, you'll have learned how to design such a database.

Some of the key points that define an effective relational database are

- It is easily adapted to meet future changes in design requirements.
- Its table layout and relationships are easily understood.
- It provides acceptable performance and disk space utilization.

Note: The topics discussed this hour apply equally to databases you create for the Access integrated data store or for SQL Server back-end databases which you create through an Access project file. Because both back-end databases are relational databases, the concepts and techniques are applicable to both.

Relational Databases

There are many different qualities which make a database system a relational database. A relational database can best be described as a set of data tables, each modeling a single entity and having certain "key" fields in common with other tables. These key fields establish the relational links between the data tables. The relational database model excels in providing the capability to collect, organize, and report on data that might be of a different nature, but is in some way related. This section discusses relational databases in detail by providing definitions for the database terms used when discussing relational databases.

The many table relationships contained in the Northwind sample database are shown in Figure 16.1. The lines connecting the tables represent the joins (that is, relationships) between the key fields in the tables. It should be obvious that the Northwind database is a highly relational database, containing many related tables.

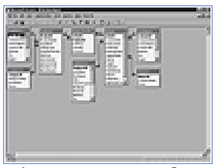

Figure 16.1 The Northwind database's Relationships window.

Review of Relational Database Terms

Most objects used in a relational database closely parallel objects used in spreadsheet applications and flat-file databases; therefore, the terms are not difficult to visualize or understand. Although this section will not serve as a complete dictionary of relational database terms, it will go a long way toward helping you create effective relational databases.

Field

The term *field* refers to the basic building block of any database, relational or not. A field is the database's way of representing a single piece of information or an attribute of an object. Fields should always be *atomic*, meaning that they cannot be broken into multiple pieces of information. For example, a field representing a person's entire name is not atomic because it could be broken into First Name and Last Name fields.

Fields are given a data type that defines the kind of data that can be stored in the field. There are many different data types available, including Text (which stores character data) and Numeric (which stores, surprise!, numerical data).

Table

A table is a collection of fields. The data contained in a table is stored as a record. Each table in a database should represent a different entity. For example, the Northwind database contains separate tables for customers, suppliers, employees, products, and orders. Although these are all related in some way, they are all completely different entities. The fact that a table can only represent a single entity should not be overlooked—it is one of the keys to creating an effective relational database. Figure 16.2 shows the Customers table in Datasheet view. Notice that the table's fields are represented as columns in this view of the table.

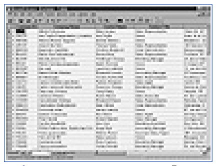

Figure 16.2 The Northwind database's Customers table.

Record

A record is a collection of data for a specific object or table. In the Northwind database, a customer record is the row of data stored for each customer (see Figure 16.2, where each record is represented as a row in the view). Each record in the database should contain a unique piece of information, representing one specific instance of the entity represented by the table. In the Customers table, for example, each record should represent one and only one customer.

Because a relational database does not store or retrieve records in any set way, there is no physical order to the records. In other words, there is no concept of a record number as there is in many other database systems.

Key Field

A field is said to be a key field when it can be used to relate two or more tables to each other. The keys are fields that these related tables have in common. The data values stored in key fields are identical between related records in the related tables. For example, in the Orders table, `CustomerID` and `EmployeeID` are fields that relate a specific order to a customer and an employee, respectively. Therefore, if an order record is created for Around the Horn (a customer in the Northwind database), the `CustomerID` field in the Orders record will contain the data `AROUT`. This, of course, is the `CustomerID` value found in the Customers table for Around the Horn.

Keys are classified as either primary, foreign, or composite, depending on their use and the fields that comprise them. Primary keys uniquely identify a record. Foreign keys point to a related record in another table. Composite keys are those made up of two or more fields. These three different types of keys are discussed in detail in the upcoming section "The Three Types of Keys."

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Relationships and Joins

A relationship between two tables indicates that the two tables share a common key value. The order record discussed in the preceding section is related to a customer. The fact that the order has a value in its `CustomerID` field establishes a relationship between this particular order and Around the Horn's record in the Customers table.

A join is a sort of virtual table created when the user requests information from different tables that participate in a relationship. The key fields are used to find the matching records in the different tables participating in the join. Figure 16.3 illustrates a join created to return the customer name and phone number along with some details about orders they've placed.

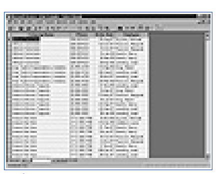

Figure 16.3 Using a join to return information from multiple tables.

A more advanced form of a join is called the self-join. This is a join in which a table is joined to itself based on a field or combination of fields that have duplicate data in different records. This can be used in the Northwind Employees table, for example, to create a join among the employees using the `ReportsTo` and `EmployeeID` fields. The `ReportsTo` field might contain the `EmployeeID` of another employee's record in the table. This `EmployeeID` would be the `EmployeeID` of the employee the current employee reports to.

The Three Types of Keys

As mentioned previously, there are three different types of keys: primary, composite, and foreign. A database's keys really do unlock the relationships contained within the database, but only if they're correctly implemented. The types of keys you use in a table are dictated by what the table is representing and how it relates to other tables in the database.

Tip: Give each key field the same field name throughout the database. This makes creating joins between the tables easier. It also aids in understanding the database design. For example, any field which is used as a customer identifier should be called `CustomerID` in all tables in which it appears.

Primary Keys

Each table in a relational database should have a unique identifier that consists of one or more fields. Without this unique identifier, there is no way to define relationships between tables. The field or group of fields that is the unique identifier for a table is called the table's primary key. The selection of which field or fields to use as the primary key is one of the most important decisions made when designing a database.

The primary key must be able to uniquely identify each record in the table and, therefore, must never have duplicated values. For this reason, I recommend that you use the `AutoNumber` data type when creating a primary key field. Using an `AutoNumber` field guarantees that a duplicated value is never inserted in the primary key field. Access automatically inserts a unique value in the field when a record is inserted into the database. Access also prevents you from modifying or deleting the values in this field after they are inserted.

There are also a great many database professionals who prefer to use what are called "natural keys." These keys derive their value from some combination of the data contained in each record. For example, you might combine the first several characters of a person's last name with the first few characters of their first name and the last four digits of their telephone number. Chances are pretty good that this data won't be repeated, but it isn't guaranteed to be unique (which is why I personally lean to the AutoNumber route).

Note: If your back-end database is on SQL Server, you won't find an AutoNumber data type. Instead, SQL Server allows you to specify that a field with numeric data types of `int`, `smallint`, `tinyint`, `decimal`, or `numeric` be an *identity* column. This has the same effect as the AutoNumber data type provided by the integrated store.

If you'll look back to Figure 16.1, you'll see that the primary key fields of each table are displayed in a bold typeface.

Composite Keys

There are often cases in which a record cannot be uniquely identified by a single field. In these cases, a composite key is used. A composite key is the group of fields that together uniquely identify a record. A composite key is also the primary key for that table. Although duplicate values are allowed within any of the fields of a composite key, there cannot be duplicated values across all the fields that make up the composite key.

An example explains this concept in a clearer way. The OrderDetails table is used to relate a record in the Orders table to a record in the Products table. Each line item of an order references a specific product. The OrderDetails table has a composite key consisting of its `OrderID` and `ProductID` fields. Using this table and its composite key, you can create relationships between many orders and many products. A specific `OrderID` can appear many times in the OrderDetails table, as can a specific `ProductID`. However, the same values for both `OrderID` and `ProductID` in a record cannot be repeated within the table. Each order can have only one `OrderDetail` for each product on the order. This is illustrated in Table 16.1.

Table 16.1 Sample Data from the OrderDetails Table

OrderID	ProductID
1	2
1	3
2	2
2	3
2	4

Foreign Keys

If you understand the concepts of primary and composite keys, you will easily grasp the concept of foreign keys. Essentially, a foreign key is a field (or group of fields) in one table that references the primary key field or fields of a related table. For example, the Orders table has a `CustomerID` and an `EmployeeID` field.

These fields are foreign keys in the Orders table but are the primary keys of the Customers and Employees tables, respectively. The Relationships window shown in Figure 16.1 graphically shows the relationship between foreign and primary keys. It is this relationship that actually allows Access to join data between the tables.

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Referential Integrity

The term referential integrity refers to the capability to maintain links among tables. Basically, maintaining referential integrity means that every foreign key value stored in a table must map to a corresponding record in the table that has this foreign key as its primary key.

For example, if an order was created and an invalid value was placed in the `CustomerID` field, there would be no corresponding record in the Customers table. This Orders record would be called an “orphan” record because it has no “parent” record in the Customers table. Allowing this condition would violate the rules of referential integrity and would render your data practically useless.

Access can be made to enforce referential integrity and thus avoid this situation. This mechanism is part of the Relationships window (select Relationships from the Tools menu). To change the referential integrity settings for a relationship, select the relationship by clicking the line that joins the two tables and then use the Relationships, Edit Relationship menu.

Note: If your back-end is SQL Server, Access won’t provide you with a Relationships window. Instead, you’ll need to use a Database Diagram such as the one shown in Figure 16.4. The concepts are the same as the Relationships window provided with the integrated store. However, the terms used on the relationship properties dialog are SQL Server terms, not the one’s familiar to Access database professionals.

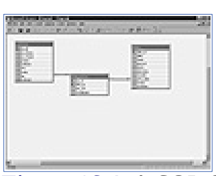

Figure 16.4 A SQL Server Database Diagram illustrating how relationships are viewed in SQL Server.

The Three Types of Relationships

The real power of a relational database is the capability to combine primary and foreign keys to establish relationships between data tables. There are three types of relationships that can be created using the relational database model. Essentially, the type of relationship created between tables determines the format of the data retrieved when the tables are joined.

One-to-One

The simplest (and least used) type of relationship is the one-to-one relationship. This means that for every record in one of the tables in the relationship, there is a single corresponding record in the other table that takes part in the relationship. Because these tables could easily be combined into a single table (thus avoiding having to join the two tables), this relationship is used only in special circumstances.

One instance where this type of join is useful involves the use of secure data. You might want certain users to have access to some fields but not to others. For example, in a human resources database you might want to give everyone access to common information in the Employees table. You would not want everyone to view the employees’ salary, however. This is a prime example of when using a one-to-one relationship is a necessity.

One-to-Many

A one-to-many relationship is a relationship in which a record in one table has one or more related records in another table. The one-to-many relationship is by far the most common relationship used in a relational database. Strictly speaking, the Northwind database contains nothing but one-to-many relationships.

In the Northwind database, there is a one-to-many relationship between the Customers table and the Orders table. Each customer can have more than one order related to it. The key field `CustomerID` is used to join the tables.

Many-to-Many

A many-to-many relationship is a relationship in which many records in one table can have many records in another table. The strict definition of relational databases does not allow for many-to-many relationships. Instead, an intermediate table is created that holds the primary keys from the two original tables as foreign keys. This creates two one-to-many relationships for the intermediary table—one for each table in the many-to-many relationship.

In the Northwind database, each product can be used on multiple orders and each order can contain multiple products. Therefore, a many-to-many relationship exists between these two tables. The OrderDetails table, illustrated in Table 16.1, is used as the intermediary table in this relationship. A one-to-many relationship exists between Orders and OrderDetails (a record in the Orders table can relate to multiple records in the OrderDetails table) and a one-to-many relationship exists between Products and OrderDetails (a record in the Products table can relate to multiple records in the OrderDetails table).

Steps to Creating a Relational Database

This section describes the methods used in creating a database from scratch. The process of creating a database structure is known as data modeling. The term modeling is used because databases are used to actually model a real-world system or collection. This section presents a methodical means of modeling data and creating an effective database.

Identifying Required Data

The first step in creating a database is to determine exactly what information needs to be tracked and what the objective for tracking this information is.

The questions to answer in this stage should deal with how the data will be used. It is important to answer as fully as possible these high-level questions up front because the answers will determine how best to structure the data within the database. By studying the current forms and reports used to track the data, you can get a good feel for the amount and types of data being tracked. You’ll also need to analyze the business process to gain some insight into how data is collected. This insight will help you in organizing the data into logical tables and also tell you how your database’s forms should be designed.

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Collecting the Identified Fields into Tables

The next step of the process is to arrange the fields you identified in the preceding step into logical tables. One of the requirements of a table is that it models one and only one entity. Thus, fields containing contact information should be stored in a separate table from fields containing company information. Also, the collection of fields used should describe the entity in question as fully as possible.

Along the way, watch for fields that are candidates for lookup tables. If the data being modeled has a field that consistently has repeated values, this field is a good candidate for a lookup table. The lookup table will most likely consist of two fields: a primary key field (the `AutoNumber` data type is recommended) and a description field that contains the values being repeated. The main table's field would then be replaced with a foreign key field that matches the primary key of the lookup table. In the Northwind database, the Shippers and Categories tables are the best examples of lookup tables.

NEW TERM A *lookup table* is a table that holds a list of possible values for a field in another table.

The use of lookup tables prevents data inconsistencies that can occur when free-form text is entered into fields. However, lookup tables might not always be warranted. The drawback to using lookup tables is that a join must be created between the base table and the lookup table in order to retrieve a meaningful description of the data stored in the lookup table. This can sometimes degrade performance if too many joins are attempted in a single query. A balance must be struck between the desire for consistent data and performance.

Identifying Primary Key Fields

Every table must have a unique identifier for each record. This can be one field or a set of fields. Attempt to identify candidates for the primary key at this stage. I recommend that if the table in question is not an intermediate table for a many-to-many relationship, an `AutoNumber` field be added to the table to serve as the primary key.

Drawing a Simple Data Diagram

Now comes the task of creating a diagram (similar to the one shown in Figure 16.1) for the new database. Draw each entity in its own box and be sure to include the primary key fields. After each entity (table) is drawn, draw the links between the tables by connecting primary (and composite) keys to foreign keys.

While these links are being drawn, check for links that would benefit from intermediate tables. These links are usually present when there are links in different directions between two tables, as is the case with many-to-many relationships.

Normalizing the Data

The process of modifying a database's structure so that it fully conforms to the relational model is known as normalization. The basic goal of normalization is to remove redundant data from the database. In the process, the final database is made more flexible and better able to absorb the inevitable changes to its structure. Now is the best time to make sure the new tables follow these recommendations!

Normalization involves the following processes:

- Ensure that each table's fields are uniquely identified by the table's primary key.
- Ensure that each field represents a single piece of information. Do not store both city and state in the same field, for instance.
- Remove redundant data from the tables. Each record of the database should contain unique data. Each unique piece of information should be stored in one place (except for key fields, which have duplicated values throughout the database).
- Remove repeating group fields if there is a possibility that more fields will be added to the group. For example, if a table holding contact information stores a home phone number, a business phone number, and a fax number, it might be wise to create a table to hold the number and a description of its type, along with a foreign key to the contact belonging to each phone number. To track additional types of phone numbers in the future, merely add the new phone number type to the list of available phone numbers. This becomes a data issue because you won't need to change the structure of the database to accomplish this task.

Identifying Field-Specific Information

After the complete structure has been created, it is time to start defining the physical layout of the tables. Here's the recommended process:

1. Create sensible field and table names. These should describe the data but not be excessively long.
2. Identify the data type for the fields: text, numeric, currency, and so on. For text fields, determine the maximum length that will be allowed. For numeric fields, determine the range of numbers that will be stored.
3. Determine whether there are any validation rules, defaults (a value that will be inserted automatically when a new record is added), or input formatting that should be applied to the field.

Creating the Physical Tables

The last step of the design process is to use Access to create the physical database tables. As you saw in the previous two hours, Access has several wizards that aid in the creation of new or linked tables. I recommend that you create some tables using the wizards and then experiment in the Design view of the tables. The upcoming hours discuss manually creating components of an Access 2000 database.

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Choosing a Back-End Database: The Integrated Store or SQL Server

Another very important consideration when designing a database is choosing the platform on which to host the new database. Access 2000 allows you to create databases using its standard, “integrated store” desktop database format or to connect to a SQL Server database.

The factors you should consider when choosing which platform to use include (but are not limited to)

- **Number of simultaneous users:** Generally speaking, if you’ll have more than about five simultaneous users you should consider using SQL Server. Although the integrated store is designed to handle multiple user connections, it’s not designed to handle a large number of such connections. On the contrary, SQL Server is designed from the ground up to handle hundreds and even thousands of simultaneous connections.
- **Data size:** Again, the larger the size of the database, the more you should consider using SQL Server. The SQL Server database engine is designed to handle large amounts of data efficiently. This is done through intelligent data caching and efficient query plans (the “execution path” that the server will take when running a query).
- **Data security:** Although Access’ integrated store provides a robust user-level security model, it is difficult to maintain and cannot be integrated with your network security model. Using SQL Server, you can more easily maintain your user groups and can provide for integrated security, meaning that your users will not be required to log in to the SQL Server database as long as they have successfully logged into your network domain.
- **System integrity:** If your database needs to run in a highly reliable, fault-tolerant environment, you should consider SQL Server as your back-end. SQL Server provides tools for maintaining and automatically backing up the data it contains. Although such tools exist for Access’ integrated store, they are not as robust and reliable as those provided by SQL Server.

Summary

During this hour you learned how to design effective databases. However, all the reading in the world is no substitute for on-the-job training. The best way to learn the ins and outs of database design is to design and work with a lot of different databases. Fortunately, Access 2000 makes database design and construction nearly painless and very time efficient.

Always remember these two key points:

- An effective database design is flexible, logical, and methodical by nature.
- The power of relational databases lies in the relationships that can be created between diverse tables.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A, "Answers to the Quiz."

Q&A

Q **Does Access require that every table have a primary key?**

A No. There is no such requirement imposed by Access itself. However, if the table is going to be used in conjunction with another table (that is, in a join), there should be a unique identifier in order to create the joined data.

Q **Does Access have any built-in features for assisting in the use of joins?**

A Yes. When a relationship is defined between two tables, you can specify the type of join to use when querying on both of the tables in the same query. This is done by opening the Join Properties dialog in the Relationships window. You access the Join Properties dialog by double-clicking the line representing the join in question.

Quiz

1. Name the three types of keys.
2. What is the main difference between a primary and a foreign key?
3. Name the three types of joins.
4. Briefly define normalization.
5. Having multiple fields in a single table to represent different types of phone numbers is an example of what?

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Hour 17
Creating Tables

Craig Eddy

In Hour 16, "Planning and Designing Your Database," you learned about relational databases and how they should be structured. In this hour, you'll learn how to create the physical tables that make up the database. Tables are the storage bins for the information that your database will hold.

If you've been reading this book sequentially, some of the material you find here will be a review of the material from Hour 6, "Using an Existing Table" and Hour 10, "Modifying an Existing Table." If you haven't yet read the material in those hours, you might want to skim them before proceeding.

Before you proceed with creating a new table, you should follow the steps in Hour 16 to design your new table. In other words, you should know the name of the new table, the type of data it contains, the names of the fields in this new table, and which field or fields the primary key should consist of.

Many Means to the Same End

Like most tasks you encounter in Access 2000, you can create tables using any of several techniques. Access provides five different mechanisms for creating tables. In this hour you'll learn about two of those mechanisms, Datasheet view and Design view.

The five table creation techniques are

- **Table Wizard:** This is probably the easiest way to create a new table. The Table Wizard enables you to create a new table based upon predefined templates. This wizard was covered in Hour 14, "Creating a Database Using Wizards."
- **Datasheet View:** Creating a table using Datasheet view involves entering data into a blank datasheet. Access then uses this data to determine the data types and other properties for the fields in your new table. Although you can get started quickly with this method, you'll nearly always have to resort to the Design view method. The Datasheet view technique is covered more later in this hour.

- **Design View:** Typically you'll create your tables using the Design view. Here you have complete control over the data types and properties for the table's fields, as well as the ability to create primary keys and other indexes. The Design view is different for the desktop and the SQL Server data stores, but the concepts are nearly identical. This technique is also covered in this hour.
- **Import Table:** Using this technique, you use an external data source to create a new table and populate it with data from that data source. This creates a copy of the data within your Access data store. Any changes you make to the Access data store will not be reflected in the original data. This technique will be covered in Hour 22, "Exchanging Data with Word 2000, Excel 2000, and Other Applications."
- **Link Table:** Like the Import Table mechanism, the Link Table requires an external data source for its data. However, this technique does not create a physical table within your Access data store. Instead, Access creates a live link to the external data source. Any changes you make from within Access will be reflected in the external data.

Note: If you're using SQL Server as your back-end data store, you can only use the Design view and Import Table techniques to create a new table. The other techniques will be unavailable.

Creating a New Table

Now let's take a look at how you can use the Datasheet view and Design view methods to create new tables. Both of these methods begin in the same way. To get ready to create a new table, follow these steps:

1. Open the database to which you want the new table to be added. Activate the Database window.

2. If the Tables list is not active, click on the Tables entry at the left of the Database window. Your screen should appear similar to Figure 17.1.

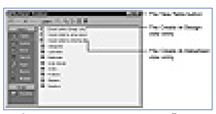

Figure 17.1 The Northwind Traders database's Tables list, containing the Create Table entries.

3. To create a table using the New Table Wizard discussed in Hour 14, double-click the Create table by Using Wizard entry.

To create a table using the Datasheet view, double-click Create Table by Entering Data.

To use the Design view method, double-click Create Table in Design View.

You can also click the New button and select one of the methods from the New Table dialog box shown in Figure 17.2. This dialog box also provides you with the Import Table and Link Table methods.

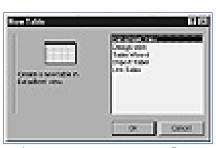

Figure 17.2 The New Table dialog box.

If your back-end database is on SQL Server, your Tables list will only contain the Create table in Design View entry (recall that this and the Import Table method are the only options for creating tables in SQL Server). Likewise, when you click the New button, you'll be taken immediately to the SQL Server table Design view. Figure 17.3 shows the Table list for the Northwind Traders database hosted on a SQL Server database.

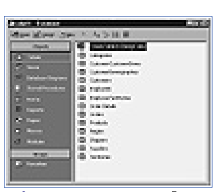

Figure 17.3 The Northwind Traders database's Tables list when hosted on SQL Server.

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Creating a Table in Datasheet View

To create a table using the Datasheet view method, make sure you follow the preceding steps, selecting the Create table by Entering Data entry on the Database or the Datasheet View entry on the New Table dialog box. Having done so, your screen should resemble Figure 17.4 (after you maximize the Datasheet view window that appears).

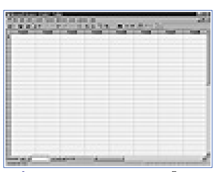

Figure 17.4 The Datasheet view when creating a new table.

The new table is now ready for you to start entering data. Access will use the data you enter to help it decide what data types and properties to use for the fields in your new table. You should already have created a list of the fields for this new table and the data that they'll contain. Make sure you have this handy as you follow the steps outlined later in this hour.

A few notes about this Datasheet view are in order. If you scroll across the window to the right, you'll notice that Access has provided you with 20 columns, labeled Field1 through Field20 These are the default names for the fields in the new table. You'll change these names to match the field names in your new table. If there are more that 20 fields in your new table, you can easily add columns to the Datasheet. If you have fewer than 20 fields, you simply won't enter data into the extra columns. Access will then ignore these columns when saving the new table.

Also, the Datasheet view for the new table has a default of 30 rows (recall that each row in the Datasheet view represents a single record in the table). If you have more than 30 records to enter, Access will automatically add a new row after you save the 30th row. If you have fewer than 30 records to enter, Access will simply ignore any empty rows when you save the table.

Follow these steps to create the table:

1. Your first step is to get the proper field names into the table. To rename a field from the default (Field1, for example) to the field's real name, double-click the column header (double-click on the

word Field1, for example) and type the name of the field.

2. Repeat Step 1 for each field in your table. If you have more than 20 fields, right-click over the column header of any column and select the Insert Column. You can also use the Insert menu and select Column. Rename the new column appropriately using the technique in Step 1. Repeat until you have enough columns for your table.

3. Begin entering the data for your table. Each row in the Datasheet represents a single record and each column represents a single field.

If a field contains numeric data that should be formatted in a certain way (such as a currency field), enter the characters that define that. For example, enter data for currency fields using the dollar sign ($6.50, for example).

4. After you've entered data for each field, and enough rows to properly define the fields, click the Save button on the toolbar.

5. Access will prompt you for the name of the new table. Enter an appropriate name for the new table and click the OK button.

6. Next, Access informs you that there's no primary key defined for the new table (see Figure 17.5). There's no way to define a primary key field using the Datasheet view, so Access is now giving you a way to automatically create one. If you click Yes, Access will create a new field named `ID`, will define that field as an `AutoNumber` field, and will make that field the primary key for the table. If you click No, your table will be left as-is. You should later open the table in Design view and define the primary key. Clicking Cancel will simply return you to the Datasheet view.

Figure 17.5 The Create Primary Key dialog box.

7. After the table is saved, it will be opened again in Datasheet view. To return to the Database window, simply close the Datasheet View window. You'll see that the new table has been added to the Tables list.

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Creating a Table in Design View

Now that you've seen how to quickly create a table using Datasheet view, it's time to delve into the most common mechanism for table creation: the Design view. Although the Datasheet view will get your table off the ground quickly, you're at the mercy of Access to decide what data types to use and what values to assign to the various properties for each field. The Design view method enables you to specify all this information from the get-go.

To create a table using the Design view, follow the steps outlined earlier and double-click the Create Table in Design View entry on the Tables list. Figure 17.6 shows the Design View window for a new table using the default Access data store.

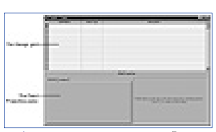

Figure 17.6 The Design View window for a new table.

Note: For more information on working with the Design View window, refer to Hours 6 and 10.

For more information on designing tables for relational databases, see Hour 16.

With the Design View window opened, and your new table's design handy, follow these steps:

1. The cursor should be in the first column of the first row of the design grid. This column is where you enter the name of the field. Enter the name for this field and press the Tab key or click in the Data Type column.
2. A default data type, usually `Text`, will be entered into the Data Type column for you. If this is not the correct data type, there is a dropdown list from which you can pick the appropriate one for this field. Select the data type from the list (see the section "Data Types" later in this chapter for more details). Press the Tab key or click in the Description column.

Tip: You can change the default data type which Access uses by invoking the Options dialog box (click the Tools menu and select Options). In the Options dialog box, move to the Tables/Queries tab. The value entered in the Default field type dropdown list is the data type that will be used by default.

3. Although certainly not a requirement, you should enter a description of the field. This will serve as documentation of the field's purpose, possible values, or other pertinent information. The text entered here will also be used as the default status bar text whenever this field is selected on a form. After you enter a description, click in the Field Properties pane.

4. Make any changes necessary to the field's properties. In particular make sure that, for text and numeric data types, the `Field Size` property is set correctly for the data that the field will contain. For more information on field properties, see the section "Field Properties" later in this chapter and review the sections on field properties in Hours 6 and 10.

5. To add another field to your new table, click in the Field Name column of the next empty row in the design grid and return to Step 1. When you've entered all your fields, proceed to Step 6.

6. Your table should have a field or a set of fields which serve as the primary key (check your table's design). If there's only one field, click in this field's row in the design grid. Next click the Primary Key toolbar button.

If the table's primary key has multiple fields, you'll need to select each field. First click in the row header for one of the fields. This will select the entire row. Next, hold down the Ctrl key and click the row header for each additional field involved in the primary key. When you've selected each primary key field in this manner, click the Primary Key toolbar button.

7. Click the Save button on the toolbar to save the new table. Access will prompt you to enter a name for the table. Do so and click the OK button. The new table will now be part of your database. Close the Design View window. Notice on the Tables list that your new table is now included.

Congratulations! You've just seen two handy ways to create new tables in your database. Most of the real work should have been completed before you got to this hour (in Hour 16, "Planning and Designing Your Database"), so these steps were probably a breeze for you.

If you're using an Access project with a SQL Server back-end database, the Design View window for a new table is a bit more complicated (see Figure 17.7). As you can see, there is no separation of the design grid and the field properties pane; they're both contained within the grid. The general steps involved in creating tables for SQL Server aren't much different from the desktop database steps, but the specifics are beyond the scope of this book. In the upcoming "Field Properties" section you'll find an explanation of the more widely used of the field properties represented by the columns seen in Figure 17.7.

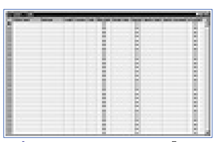

Figure 17.7 The Design View window for a new SQL Server table.

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Data Types

Each field in a table, whether you created the table with Datasheet view or Design view, has a data type assigned to it. The data type specifies the type of information that will be stored in the field. Choosing the data type for each field is one of the database design steps discussed in Hour 16.

The data types available for the default Access desktop database store are

- `Text`: A string of characters used to store alphanumeric data. You can have up to 255 characters in a `Text` field.
- `Memo`: Stores long text fields. These can store up to 64,000 characters, but you don’t specify a maximum size as you do with `Text` fields.
- `Number`: Stores numeric data.
- `Date/Time`: Stores dates and times.
- `Currency`: A special numeric data type used for monetary values because it prevents round-off errors during calculations.
- `AutoNumber`: A special numeric data type that is perfect for use in a primary key field because Access automatically inserts either the next number in the sequence or a unique random number when a data record is created. Because Access is responsible for filling in values for this type, `AutoNumber` fields are always read-only.
- `Yes/No`: Stores Boolean data, which can contain only one of two values, such as `On/Off`, `Yes/No`, or `True/False`.
- `OLE Object`: This data type stores data provided by an object or component that acts as a Windows OLE server.
- `Hyperlink`: Stores the text for a hyperlink address. Access enables you to store addresses to Web documents, network files, and local files. The hyperlink also can contain more detailed information, such as a bookmark in a Word document, an object in an Access database, or a range of cells in an Excel spreadsheet. After a Hyperlink field is clicked, Access attempts to load the referenced file or document using the appropriate viewer.

The list of data types for a table on a SQL Server database is quite a bit longer than this list. The more common of these data types are:

- `Binary` and `varbinary`: Binary data consists of the characters `0` through `9` and `A` through `F` (or `a` through `f`), in groups of two characters (each group representing a single value). This data type is intended for storing bit patterns, not hexadecimal numbers. The `binary` data type requires you to specify a size; the `varbinary` data type is for variable-length data.
- `bit`: The `bit` data type will store only the values `0` or `1`. If any value other than `0` is entered into a field of this type, it will be converted to `1`.
- `char` and `varchar`: Used for storing alphanumeric strings up to 255 characters in length. The `char` data type has a specified length; the `varchar` data type is for variable-length strings.
- `smalldatetime` and `datetime`: Used for storing date/time information. The `smalldatetime` data type is less precise than the `datetime` data type, storing data in increments of minutes, as opposed to milliseconds for the `datetime` data type.
- `decimal` and `numeric`: These data types store exact numeric values, down to the least significant digit. They differ from the `float` and `real` data types, which can only approximate the least significant digit. You'll specify a precision that determines how accurately the data is stored.
- `float` and `real`: These data types are for storing numeric data that does not require the precision provided by `decimal` or `numeric`.
- `image`: Used for storing variable-length binary data, similar to the `OLE Object` data type.
- `int`, `smallint`, `tinyint`: Used for storing integer data. Each data type is capable of storing a different range of values.
- `money` and `smallmoney`: Used for storing currency values with up to four digits following the decimal point. The `smallmoney` data type stores a smaller range of values than the `money` type.
- `text`: Similar to the Access `Memo` data type, this type is used to store extremely long string data.
- `timestamp`: A special data type that provides unique values within the database. When a record in a table containing a `timestamp` field is updated, the `timestamp` field is automatically updated, enabling programs to monitor the value the field contains in case two users attempt to update the same record simultaneously. Note that `timestamp` data cannot be used as a date/time value because it is relative to a system counter, not the actual time.

Field Properties

When you use the Design View window to create a table for the default desktop database store, you can customize a each field's properties using the General tab of the Field Properties pane (see Figure 17.6). These properties give you a powerful edge in creating the table to fit your design's needs. The following sections describe some of these properties and how you can use them.

SQL Server tables have a similar set of properties, but displayed in the design grid, as you can see from Figure 17.7. For the purposes of this chapter, I'll keep the discussion specific to the desktop database store.

Field Size

The `Field Size` property enables you to specify the amount of data that can be entered in `Text`, `Number`, or `AutoNumber` fields. Access uses variable-length record storage, so it only stores the information you actually enter into a field. In other words, if you set a `Name` field to a length of 50 and you enter `Bob`, Access stores only three characters for the field, not all 50 characters as some other database management systems do.

On SQL Server databases, this property is named `Length`.

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Format

You use the `Format` property to specify how the data is displayed in datasheets or on forms. You can use it with `Text`, `Number`, `Date/Time`, and `Yes/No` data types. There are different sets of named formats for each data type, or you can enter a format string to explicitly specify the format. For example, if you have a `Date/Time` field that you want to display as hours and minutes in the 24-hour format, set the `Format` property to `Short Time`.

This property is not available for tables that exist on SQL Server databases.

Input Masks

You use input masks to restrict what kind of data is entered into a field and how it is entered. Input masks use special characters as instructions and placeholders for data.

For example, you could specify an input mask of `!##/##/####`. The first character (an exclamation point) instructs Access to display the input mask from right to left, rather than left to right.

The pound symbols are placeholders and they restrict data to only numbers and spaces. The forward slash is a standard date separator and automatically appears when the cursor enters the field.

There is an Input Mask Wizard that you can use to help you define the value for an input mask. Simply click the builder button that appears to the right of the `Input Mask` property's edit box when the property has focus (that is, when your cursor is in the property's edit box).

This property is not available for tables that exist on SQL Server databases.

Default Value

The `Default Value` property enables you to set a default value (what else) for a field. The value entered here will be placed into the field whenever a new record is created. The user can, of course, override this value by editing the data.

This property is named the same in both Access and SQL Server.

Lookup Fields

The Lookup tab contains special properties that enable you to limit data input in a field to a list from another table or query. Using a lookup field not only makes sure that good data is entered, but it also enables the user to select a value from a list instead of having to type it.

Access provides a Lookup Wizard that will step you through the process of creating a lookup field. To start this wizard, click in the Data Type column for the field that will become a lookup field. Next click on the dropdown button to display the list of data types and select Lookup Wizard (it's the last entry in the list). If the field will be getting its list of available values from another table, that table must exist before you can use it in the Lookup Wizard.

SQL Server Field Properties

When the table exists in a SQL Server database, some of the preceding properties change names and some are not available. This section discusses the various properties displayed in Figure 17.7.

Length, Precision, and Scale

These properties determine the size and range of values available for a numeric data type.

The `Length` property, which determines how many characters or bytes are valid for a field, is set automatically when you select the data type. However, you can change the value of this property for the `binary`, `char`, `varbinary`, and `varchar` data types.

The `Precision` property determines the number of digits that the field uses. The `Scale` property sets the number of digits that are to the right of the decimal point.

Allow NULLS

This Boolean property enables you to specify whether or not `NULL` values are allowed in the field. A `NULL` value simple means that there has been no data put into the field.

Identity Properties

Fields that are marked as `Identity` fields (the Identity check box is checked) contain system-generated values that uniquely identify each row within the table. You use these just as you use `AutoNumber` fields in Access's default data store. Only one field per table can be an identity field.

The `Identity Seed` property is the value that will be assigned to the first row in the table. If you leave this property blank, the number `1` will be used.

The `Identity Increment` property determines what value will be added to each subsequent row's identity value. For example, if the `Identity Seed` property is set to `10` and the `Identity Increment` property to `5`, the first row will have a value of `10` in its identity field, the second row will have `15`, the third row `20`, and so on.

Creating Table Indexes

Access uses indexes as road maps to find your data in a timely and efficient manner when you run a query or report or simply browse your tables. Indexes are similar to the index in the back of this book that you use to search for a particular topic or word. If you enter a lot of records and then run a query or a report based on the fields in one of your indexes, Access can more quickly handle the output of the data.

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Setting and Changing Indexes

You create indexes on a table-by-table basis. To create an index for a table in a database using the desktop database store, perform the following steps:

1. In the Database window, select the table and click the Design button.

2. Click the Indexes button on the toolbar (the one with a few lines next to a lightning bolt). The Indexes dialog box, shown in Figure 17.8, appears. Even if this is a brand new table, Access might have created some indexes for you. For example, the primary key is always used as an index and will be listed on the Indexes dialog box.

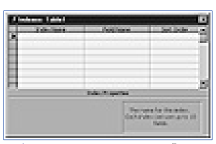

Figure 17.8 The Design view's Indexes dialog box.

3. Click an empty row in the Index Name column. Type a name for the index. The name must be unique on the current table. Any name will do because chances are pretty good you'll never need to refer to it by name.

4. In the Field Name column, click the arrow and select a field to include in this index.

5. If the index will include multiple fields, click in the Field Name column of the row immediately following this one and select the next field's name. Do not enter anything for the Index Name column on this row. Repeat this step for each field in the index. Figure 17.9 shows an example of how an index with multiple fields would be displayed.

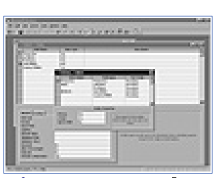

Figure 17.9 The Indexes dialog box for multiple-field indexes.

6. If you have additional indexes to define, return to step 3. Otherwise, click the Close button on the

Indexes dialog box to return to the Design view window. Be sure to save the table design (Access will prompt you if you attempt to close the Design view window without having saved the changes).

If your table is in a SQL Server database, there is no Indexes dialog box. Instead, launch the table's Properties dialog box by clicking the Properties button on the Design view window's toolbar. Next move to the Indexes/Keys tab and click the New button to create a new index (see Figure 17.10). Access will create a default name for the index and put the focus in the Column Name column. Select the name(s) of the field(s) to be used in the index. SQL Server indexes provide a few properties that aren't available in the desktop database store and are beyond the scope of this book. Consult your SQL Server documentation for an explanation of these index properties.

Figure 17.10 The Indexes/Keys tab of the SQL Server table Properties dialog box.

Caution: If you're creating a new table in SQL Server and want to specify its indexes, you must save the table first. This also applies when you alter the table to add fields. You must save the table before the new field(s) will be available on the Indexes/Keys tab.

Which Fields to Index

It is not always obvious what types of fields should be indexed. Some data types, such as text, seem to always perform better with an index. `AutoNumber` fields and other nontext fields don't seem to gain much benefit from indexing. As a rule of thumb, you should index any `Number` or `Date/Time` fields that are frequently used as search criteria in queries. Some database pros feel that you cannot have too many indexes on a table. It's important to realize, however, that every index placed on a table must be updated whenever records are added, modified, or deleted.

Setting Relationships Between Tables

Access 2000 uses relationships to relate the data within various tables, especially when they're used in queries. Hour 10 discusses relationships, why you would want to relate tables to one another, and how to work with the various properties of table relationships. In Hour 16 you learned how to design properly related tables, the meaning of referential integrity, and what the three types of relationships (also called "joins") are. These concepts are all used when defining relationships among the tables in your database.

To establish a relationship between two tables:

1. Close any tables you might have open and activate the Database window.

2. Click the Relationships button on the toolbar or click the Tools menu and select Relationships. Depending on your database, you might or might not have some relationships already established (see Figure 17.11).

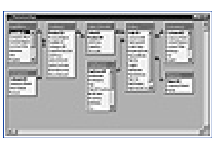

Figure 17.11 The Relationships window for the Northwind Traders database.

3. If either of the tables that are involved in the relationship is not visible in the Relationships window, click the Show Table button on the toolbar (a yellow plus symbol). If you prefer to use the menu, click the Relationships menu and then select Show Table.

4. Double-click the two tables. This adds them to the Relationships window. Click the Close button.

5. Drag the tables around so they are side-by-side and easier to work with.

6. Now the fun part: Select the table that contains the foreign key field (recall from Hour 16 that this is a field which is used to "look up" a row in the related table). Click the foreign key field and drag this over to the primary key field of the related table. Drop it right over the primary key field. Access displays the Relationships dialog box.

7. Verify that the fields from each table are correct. Using the information from your database design and what you learned in Hour 16, set the various properties of this new relationship.

8. Click the Create button and the Save button on the toolbar. Your new relationship is now safely embedded into your database.

If you are using the SQL Server back-end database, you won't have a Relationships toolbar button or a Relationships window as in the desktop database. Instead, Access 2000 provides a new type of object called the database diagram. The database diagrams work in a nearly identical fashion to the Relationships window, but using SQL Server terms and constructs. Figure 17.12 shows the Relationships database diagram for the Northwind Traders SQL Server database. Notice the similarities to Figure 17.11.

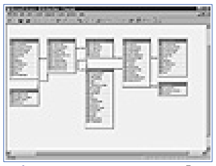

Figure 17.12 The Relationships database diagram for the Northwind Traders SQL Server database.

Discussion of the intricacies of establishing relationships and setting their properties is beyond the scope of this book. However, if you're familiar with SQL Server database administration, you'll learn to greatly appreciate the power of the database diagram object provided by Access 2000.

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Summary

In this hour you've learned all about creating new tables by hand. There are several ways to create tables: Using the Table Wizard, Datasheet view, or the Design view, importing tables, and linking to tables. This hour covered the Datasheet view and Design view methods.

You also learned about the various data types which are available for fields, as well as the properties that you can set on the fields. Finally, this chapter covered indexes and relationships.

In the hour that follows, "Creating Queries," you'll learn all about how to create queries in your Access database.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q When is it appropriate to use a table wizard instead of using Datasheet or Design view method?

A Access wizards are great for producing simple, cookie-cutter solutions. They are useful for quickly creating a prototype model, which can then be modified to more exactly fit your needs. However, as you gain experience creating tables from scratch using the Design view method, you'll probably find yourself using it more and more.

Q I created a table using the datasheet view, and I entered the following numbers in a column: `4500`, `6325`, and `$3456`. When I saved the table, Access selected Text as the data type for this column. Why did Access create is as a text field?

A Access is pretty smart about selecting the correct data type. However, if you enter a mixture of data types—in this case general numbers and a currency number—Access will pick a data type that they will all fit into, which is usually the Text data type. If you had entered the currency number in the first row, Access would have selected Currency as the data type.

Q When creating a table in Design view, what is the Description column used for?

A The Description column is valuable for a couple of reasons. First, it is a way to document your fields when you create them. Sometimes when creating tables, developers create names that are short and meaningful, but that don't make much sense a year or two later. Secondly, descriptions show up in the status bar at the bottom of the screen when you enter that field in Datasheet view, and are a handy way of reminding your users the purpose of that field.

Quiz

1. Which method would you use to create a table if the original data source was in an outside database and you wanted to update the original data when you changed the data in Access?

2. What is the data type that you use when you want Access to automatically create unique values for each new record?

3. How would you restrict data in a field to only dates?

4. What's the main purpose for creating table indexes?

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Hour 18
Creating Queries

Craig Eddy

In the previous hour, you learned how to create new tables in a database. In this hour you learn how to add queries to your database. Queries, which were also covered in Hour 7, “Using Existing Queries” and Hour 11, “Modifying and Using Existing Queries,” are used to retrieve specific data from the tables in the current database, from other data sources, and even from other queries. Such queries are called select queries. Queries can also perform actions upon the data in your tables, such as updating or deleting specific records. These queries are called action queries.

NEW TERM A *select query*, the most common kind of query, retrieves data from one or more tables (or other queries). The resulting data can be displayed in a datasheet or used as the data source for forms, reports, or data access pages.

NEW TERM An *action query* is a query that’s designed to perform some sort of operation on the data in a table or tables, or to modify a table’s structure. There are four kinds of action queries: the delete query, which is used to delete rows from the database, the update query, which is used to update data in the database, the append query, which is used to add new rows to a table or tables, and the make-table query, which creates a new table using data in existing tables.

In this hour, you’ll learn the following:

- The various ways available to create queries
- How to create a query “by hand”
- How to use parameters and calculated fields in your queries

On a SQL Server database queries are called views. If you’re using an Access Project to design a SQL Server database, you’ll have a different, but very similar, set of tools available for creating views. Although this hour focuses on creating queries for the default Access data store, I will point out major differences to watch out for when dealing with SQL Server views.

Ways to Create Queries

Like most tasks in Access 2000, you have your choice of means to create new queries. Access provides five different mechanisms for creating queries:

- Design view. This is the manual means of creating a query. The Design view method provides you both a QBE Design Grid (known, confusing as it is, as the "Design view" on the View menu and toolbar button) and a SQL View. The Design Grid, discussed in the next section, is a graphical tool for creating queries. The SQL View enables you to fine tune the SQL code that underlies the query. This is the only method described in this hour, and the only method available when creating with SQL Server views.
- Simple Query Wizard. This wizard enables you to create the most basic of select queries. And when I say basic, that's exactly what I mean. About all this wizard automates is the task of selecting which tables and queries will be used as the source of the data and which fields from those queries will be output by the query.
- Crosstab Query Wizard. This wizard helps you create a crosstab query, which displays summarized values from one field in a table and groups them by one set of data listed down the left side of the datasheet (such as a region or category) and another set of data listed across the top of the datasheet (such as year, quarter, or month). For example, you may wish to see sales grouped by region and quarter. The Crosstab Query Wizard assists you in creating such a query.
- Find Duplicates Query Wizard. Assists you in creating a query which will identify duplicate data contained in a table or returned by another query.
- Find Unmatched Query Wizard. This wizard helps you find records which are "orphaned" by related tables. In other words, records that should be related to one or more records in a different table but aren't. Orphaned records can be created when referential integrity is not enabled for a relationship and records are deleted from one of the tables. Hour 16, "Planning and Designing Your Database," discusses how referential integrity prevents orphaned records.

The Query Design View

Whenever you edit an existing query or create a new query using the Design view method, you'll more than likely see the Query Design view shown in Figure 18.1. Using the Design view you can visually create and modify the query which is being displayed. Throughout this hour, the terms Design Grid and Design view refer to the same window (the one shown in Figure 18.1).

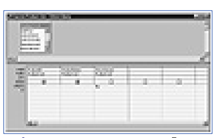

Figure 18.1 The Query Design Grid.

Note: Some advanced queries cannot be represented by the Design Grid. For such queries you'll only be able to use the SQL View. If the Design Grid is not available for a query, the Design view item will be disabled in the View menu when you open the query in Design mode.

The Design view is divided into two sections: the table/query pane and the field pane. The table/query pane displays a Field List window for each of the tables and queries involved in the query. The field pane at the bottom of the window is also known as the QBE Design Grid. This is where you define the fields returned by the query, set the sort order, and specify any criteria.

If you're creating views in a SQL Server database, the Design Grid has three available panes: Diagram, Grid, and SQL (see Figure 18.2). These three panes operate in a manner very similar to the combination of Design Grid and the SQL View available for queries in the Access default data store.

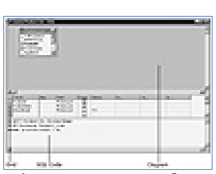

Figure 18.2 The View Design Grid for SQL Server databases.

Steps in Creating a Query

Now that you've seen the Query Design Grid, it's time to learn how to create a new query. If you need some instruction on working in the Query Design Grid, see Hours 7 and 11 where the topic is discussed in more detail. To follow along, open the Northwind Traders sample database.

There are four major steps to creating a query:

1. Create the basic query.
2. Specify the sort order.
3. Specify the selection criteria.
4. Decide which fields that you want to see.

Each of these steps can themselves be broken down into a series of steps or actions that you must performed.

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Creating a Basic Query

To create a new query, follow these steps:

1. Open the database to which you want to add the query. Activate the Database window and click on the Queries section. The Queries list will be displayed in the Database window.

2. Double-click the Create query in Design view entry in this list, or click the New button at the top of the Database window, select Design view in the New Query dialog that appears, and click the OK button. Either way, the Query Design Grid window and the Show Table dialog box, shown in Figure 18.3, will appear.

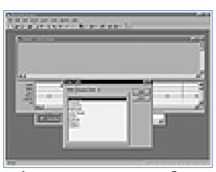

Figure 18.3 The Query Design Grid window and Show Table dialog for a new query.

3. Add the tables or queries on which this new query is to be based by clicking the table or query name and then clicking the Add button. Alternatively, you can double-click the table or query name. As an example, double-click the Customers table. When you've added the appropriate tables and queries, click the Close button. This will close the Show Table dialog and leave you staring at the Query Design Grid with the table/query pane populated.

4. Add the fields which will be output by the query or used as criteria for selecting records to the QBE Design Grid at the bottom of the Design View window. This is done by either dragging and dropping the field's name from the Field List window onto the QBE Design Grid or by double-clicking the field's name. For our example, add the `ContactName`, `CompanyName`, and `ContactTitle` fields. Figure 18.4 shows the results of adding these fields to the grid.

Figure 18.4 The Design View window with some query design in place.

5. Save the query using the Save toolbar button. To view the results of the query, click the drop-down arrow on the View toolbar button and select Datasheet view (or use the View menu and select Datasheet view). The datasheet window for your query will be displayed. To return to the Design Grid, use the Design View toolbar button or menu item.

Specifying a Sort Order

The query you just created is not much different than viewing the Customers table in Datasheet view. There aren't as many fields showing, of course, but otherwise the results really haven't been worth the effort. There is, however, more that you can do. One advantage of queries is the capability to specify a sort field (or fields) and sort order (ascending or descending) that's particular to the query.

To specify a sort order for a query, follow these steps:

1. With the query open in the Design Grid, find the field you want to sort by in the QBE Grid at the bottom of the Design Grid window. Click in the Sort row. If you're following along from the previous section, click in the ContactName column.
2. Click the drop-down arrow to the right of the cell and select the sort order (ascending or descending) to be used for this field. For our example, select `Ascending`.
3. Repeat step two for any other fields which should also be used as sort fields. The order from left to right that the fields appear in the QBE Grid determines which are used first in the sorting. For example, if you set ascending sort order for both the `ContactName` and `CompanyName` fields, the sorting would be done by `ContactName` first and then by `CompanyName`. This means that if two Customer records have a contact named John Smith, the two rows will appear one after the other with the value of the `CompanyName` field determining which appears first. If you're following along, set the `CompanyName` field to be sorted ascending as well. Figure 18.5 shows how the Design View window should look.

Figure 18.5 The Design View window with a sort order specified for the query.

4. Save the query's design by clicking the Save button. Go to the Datasheet view to see the results.

Specifying Criteria

Now you can select some fields and sort them in a specific way, but we're still not much better off than viewing the table's datasheet. However, queries also give you the capability of specifying the criteria with which to select the records. In other words, you tell the query what data must be present in (or missing from) the records that the query will display. This lets you work with a specific subset of data which may be more meaningful than the entire set of data contained in a table or returned by another query.

To specify criteria for your query, follow these steps:

1. With the query open in Design view, make sure the field or fields which will be used to specify the criteria are present in the QBE Grid at the bottom of the Design View window. If you're following along, add the `Country` field to the QBE Grid.
2. Click in the Criteria row for the field whose criteria you are specifying (in our example, the `Country` field). Enter the criteria to be used when selecting records by typing an expression. Alternatively, you may use the Expression Builder by clicking the Build toolbar button (the button with the magic wand). The section that follows, "Using Advanced Query Options," describes the various wild card characters and comparison operators that are available when specifying criteria. If you're following along, enter `='France'` (including the single quotes) into the Criteria row for the `Country` field. Your screen should appear similar to Figure 18.6.

Figure 18.6 The Design View window with criteria specified for the query.

Note: For the default Access data store, the case used in string expressions does not affect the query's results. In the above example, you could have entered `='FRANCE'` or `='france'` and received the same results. However, some databases (SQL Server included) offer the capability to be case-sensitive. You should determine ahead of time if your database is case-sensitive and enter your criteria appropriately. In general, you should always use proper case in your expressions.

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3. Save the query and switch to the Datasheet view. You should now see only customers who are in France.

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Showing and Excluding Fields

Now you've got a query that returns only selected fields, that sorts the returned data for you, and that shows you the subset of data that you're interested in working with. Pretty handy to have around. But if you followed along with the previous section and saw that the query returned the customers in France only, there's a little more tweaking to be done.

Notice that the `Country` field, despite the fact that it always contained the word `France`, was also returned by the query. If you know the value in the field will always be `France`, you don't really need to display that field, do you? Well, Access provides a mechanism which you can use to sort by or specify criteria on fields but not display those fields. For the default data store, this is done using the Show row's checkbox in the QBE Grid. For views on a SQL Server database, you'll have a checkbox labeled `Output` for you to use for this purpose.

To have a field appear in the query's output, make sure its Show checkbox is checked. To have it not appear in the output, clear (uncheck) the Show checkbox. If you're following along with the example, uncheck the Show checkbox for the `Country` field and view the datasheet again. Your results should appear similar to Figure 8.7.

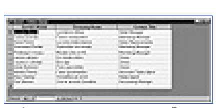

Figure 18.7 The Datasheet View window for the sample query.

Using Advanced Selection Options in Queries

So far in this hour you've learned how to create a basic query. Access 2000 provides a wide variety of additional features that enable you to create more complex queries. The remainder of this hour discusses the more widely used of these features.

Wildcards

The criteria we used in the example query above (`='France'`) was perfect when we knew the exact value we were looking for from the query. But what if you don't want to require an exact match or don't know the exact spelling of a value ahead of time?

Access provides special wildcard characters which can be used in query criteria to cover such circumstances. These characters, listed in Table 18.1, can be used as placeholders within the value or can specify the beginning or ending characters of a text field.

Table 18.1 Access 2000 Wildcards

Symbol	Usage	Example	Matches…
*	Used to match any number of characters in afield either at the beginning or the end of the field.	An* *an	Anne; Andrew Buchanan; allahan
?	Use to match a single Ro? character in a field	Rob; Ron; Rod	
#	Use to match any single number in a field. Use to find a single	7#7	727, 737, 747, 757, 767, 777
-	character within a range of characters you specify.	J[a-o]N	Jan, Jen, Jon

Comparison Operators

When you specify a criteria for a field, you have to instruct the query how to compare the value in the data to the expression you enter as the criteria. This is done using a comparison operator. The equals sign (=) in our example query (where we used `=‘France’` as the criteria) is the comparison operator for that criteria.

Table 18.2 shows the various comparison operators available in Access 2000, along with some examples that utilize each operator.

Table 18.2 Access 2000 Comparison Operators

Operator	Description	Example	Result or Valid Value
IN()	Match any item in the list provided	`IN(‘a’,‘b’,‘c’)`‘a’;‘b’;‘c’	
<	Less than	`<12/31/96`	12/30/96
<=	Less than or equal to; includes the value you specify	`<=5000`	5000,4999
=	Equal to	`=“Janet”`	Janet
>	Greater than	`>1000`	1001
>=	Greater than or equal to; includes the value you specify	`>=1/1/95`	1/1/95,1/2/95
<>	Not equal to	`<>“Bill”`	Janet

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Creating Queries that Accept Parameters

Now that you've seen how comparison operators work, let's take a look at another advanced capability provided by Access queries.

In our sample query we added the criteria `='France'`. This criteria is just fine if we always want to return only the rows where the `Country` field has `France` in it. But what if we want to be able to choose which country will be used each time we run the query? In this case, you have to turn the criteria into a parameter.

After you've done so, you'll be prompted to enter a value for the country field each time you view the query's results, and Access will retrieve only records for that country. Now you won't have to create a query for each country, but instead can enter the desired country each time the query is viewed.

To turn a criteria into a parameter, simply replace the value portion of the criteria (`'France'` in our example) with a prompt question surrounded by square brackets. For our example, change the criteria to read `=[Enter the desired country]`. Then view the query in Datasheet view. When you do this, Access will prompt you with the dialog shown in Figure 18.8. Enter a value (no need to enter the single quotes on this dialog, Access will supply them for you when it evaluates what you enter here) and click the OK button. The results are displayed in the Datasheet view.

Figure 18.8 The Enter Parameter Value dialog box.

If you want to verify that the value you enter in the dialog is the value actually used, make sure the field is being displayed in the query's output. For our sample query, return to the Design view and check the `Show` checkbox for the `Country` field. Then switch back to Datasheet view, entering the desired country when prompted. Your screen should now resemble Figure 18.9. I've entered `USA` as the country to produce these results; yours will be different if you enter a different country.

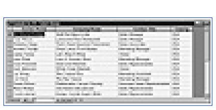

Figure 18.9 The Datasheet View window for the parameterized query example.

Adding Calculated Fields

Another useful reason to create queries is their capability to transform data through the use of calculated fields. You're not restricted to having your queries return the exact data from tables or other queries. Using calculated fields, you can perform data manipulation on the data in your database and return more meaningful results from the query.

For example, if you have an order entry table, you could create a query which calculates a discount priced based on the quantity of each item ordered. You can also use calculated fields to create a compound text field which concatenates the values of several fields in the table. This is useful for creating mailing labels where you want the name and city/state/ZIP (or city/province/postal code) fields concatenated into one line.

To see how to work with calculate fields, return to the example query and follow these steps (or, open any query in Design view mode):

1. Click in the Field row of the first empty column in the QBE Grid.
2. Enter `Addr2: [City] + ", " + [Region] + " " + [PostalCode]`. This specifies that the calculated field should be named `Addr2` and that its value should be calculated by concatenating the values of the `City`, `Region`, and `PostalCode` fields. The square brackets in the expression inform Access that what's within the brackets is a field name. If you have the same field name in two different tables referenced by your query, use the format `[`*`tablename.fieldname`*`]` to indicate exactly which field you mean.
3. You can leave the Table row empty for this field. Check the Show checkbox so that the field will be output by the query. Your screen should appear similar to Figure 18.10.

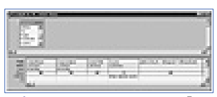

Figure 18.10 The Design View window with the calculated field.

4. Click the View button to switch to Datasheet view. Enter an appropriate country when prompted (remember that we added a parameter to the query earlier in this hour).

Additional Query Features

There are many more features offered by queries than we can possibly cover in a single hour. As you create new queries to meet newly discovered needs, you'll no doubt want to explore the many other features available. The Access 2000 help files are a great place to find out about all of these features. Some topics I'd suggest searching for include

- Filtering results
- Formatting fields in results
- Optimizing performance

To close this hour, I'll briefly discuss two often-used features: grouping and totals.

Grouping the Query's Results

Grouping is similar to sorting, but using grouping you can arrange and perform calculations on your data in groups. For example, you may want to group customers by region and calculate the total amount of all sales for each region. Grouping enables you to do this.

To see how grouping works, return to the example query's Design View window and follow these steps:

1. Click the Show Table toolbar button or use the View menu and click Show Table. When the Show Table dialog appears, double-click the Orders table. Now click the Close button.
2. Switch to the Datasheet view, entering `USA` when prompted for the country name. Your screen should appear similar to Figure 18.11.

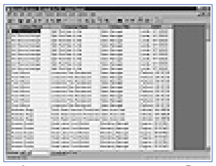

Figure 18.11 The Datasheet View window showing repeated data rows.

Notice that each customer is repeated several times. This is because each one has several related orders in the Orders table. To see that this is true, return to the Design view, add the `OrderID` field from the Orders table to the query's output, and come back to the Datasheet view. This is where grouping comes into play.

3. Return to the Design view and click the Totals toolbar button (the one with the Greek Sigma character). A row labeled Total is added to the QBE Grid and the expression `Group By` is automatically entered for each column in the QBE Grid. If you added the `OrderID` field in step 2, remove it now by clicking its column header in the QBE Grid and pressing the Del key.

4. Now go back to the Datasheet view and notice that the duplicate rows are now missing from the query's output.

What's happened here? Access has combined each duplicate row into a single row in the query's output. Although the above steps don't display any meaningful results, they do demonstrate how the rows are grouped. In the following section, you'll see how that grouping of similar data can be used to produce meaningful summary data.

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Queries that Display Totals

Now that you know how to group your data, let's take a look at how you can calculate some meaningful summary data using those groups. Access can perform counts, sums, averages, standard deviations, and min/max summary calculations on your grouped data.

To see how this can be useful, return to the example query and open the Design View window for it. Now follow these steps:

1. Add the `CustomerID` field to the QBE Grid.
2. Click in the Total row for the `CustomerID` field and click the drop-down arrow. Select `Count` from the drop-down list.
3. Click the Properties button on the toolbar. When the Properties window appears, enter `# of Orders` into the `Caption` property. Close the Properties window.
4. Switch to Datasheet view, entering `USA` as the country when prompted. Your screen should look like Figure 8.12.

Figure 18.12 The Datasheet View window showing a summary of the grouped data.

This query provides you with a count of the number of orders placed by each customer in a specified country. Pretty handy, wouldn't you say? But let's look at an even more powerful summation, the total.

1. Return to the Design View window.
2. Add the `Freight` field from the Orders table to the QBE Grid.
3. In the Total row for `Freight`, select `Sum`.
4. Switch to Datasheet view, again entering `USA` as the country. You should see results similar to Figure 18.13.

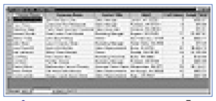

Figure 18.13 The Datasheet View window showing even more ways to summarize grouped data.

Now you can see not only how many orders each customer has placed, but also the total amount they've paid for freight. You can see how this example can easily be extended to calculate other summary information.

Summary

In this hour you've learned about creating queries. Queries are used to view and manipulate the data that exists within your database. You've seen how to sort the results, specify criteria for record selection, and how to exclude fields from the queries output. You also learned how to create a parameter to use as part of the query's criteria, allowing you to use the same query to return different subsets of data. Finally, you learned about some of the powerful grouping and summary features available with Access queries.

In the next hour, "Creating Forms," you learn how to create new forms from scratch. This includes adding controls to your forms and binding the form to one of the database's tables or queries.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What is the star (asterisk) at the top of each table when in Query Design mode?**

A This is the symbol for ALL, just like the wildcard character. As a shortcut to selecting all the fields in the table, you can insert the star in your query (by double-clicking). Then, when you view the query, all the fields in the table will be displayed.

Q **How do I enter more than one criteria per field in a query? For example, what if I want to search for customers in either England or France?**

A In the Design Grid window you will notice in the lower section of the grid, you have a row called Criteria. Below that is a row called or. You can enter as many criteria as you want by simply entering a criteria on each row. So, you'd enter `'England'` in one row and `'France'` in the row immediately below.

Q **I have a query that has a lot of duplicates in it. How do I select only unique records?**

A While in Design view mode, select View, Properties from the menu. Click on the property for Unique Values. Change this to Yes.

Quiz

1. You have a query that returns a number of fields, including `Title` and `Hire Date`. How would you sort a query first by `Title` from lowest to highest, and then by `Hire Date` from highest to lowest?
2. Which wildcard symbol would you use to match a single character in a field?
3. What does the >= operator mean?
4. How do I get the total of all the values in a field?

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Hour 19
Creating Forms

Timothy Buchanan

In this hour, you create forms from scratch. You will take a couple forms from the Northwind database and re-create them to give you a better understanding of forms and form design. Some of the topics covered in this hour are

- Types of forms
- Types of controls
- Creating and adding controls
- Setting control properties
- Creating expressions
- Creating and linking subforms
- Aligning and sizing controls
- Adding graphics

Note: Earlier, in Hour 15, "Adding Additional Components to a Database Using Wizards," you learned how to create forms using wizards. This hour concentrates on building forms from scratch without using wizards. This gives you a better understanding of the design and inner workings of a form.

Types of Forms

As discussed in Hour 12, "Modifying an Existing Form Design," there are six basic types of forms:

- Single column
- Tabular
- Datasheet
- Subforms

- Pivot table
- Graphs

You will concentrate on creating three types of forms in this hour: single column, tabular, and subforms. You will look at some forms in the Northwind database and then learn how to re-create them from scratch.

Types of Controls

As discussed in Hour 12, there are three basic types of controls:

- Bound controls are controls whose source of data is a field in a table or query. When you enter a value into a bound control, that value updates to the bound table's current record.
- Unbound controls are controls that do not have a source of data. These controls retain any values you enter but do not update any field in the table.
- Calculated controls are controls whose source is an expression instead of a field in a table or query. These controls are based on expressions or calculations. Calculated controls do not update any table fields, so they are also a type of unbound control.

Adding Controls

Figure 19.1 shows the Customers form from the Northwind database. You will re-create this form from scratch to learn how to create your own forms.

Figure 19.1 The Customers form from the Northwind database.

Designing a Form

Look a little closer at the Customers form before you attempt to re-create it. As you can see in Figure 19.1, the Customers form lists all the information about the customer: ID, name, address, phone number, and so on. Each page of the form lists the information about one single customer. The country field has a drop-down list box to enable the user to select the customer's country. A globe graphic is in the background to spruce up the appearance. When you select the Design View button in the upper-left corner, the display changes to the Design view. There are a couple ways to tell which table or query the form is linked to. If it is not already visible, click the Properties tool to display the property sheet. If you select the form, the property sheet displays the properties for the form, as shown in Figure 19.2.

Figure 19.2 The property sheet for the Customers form.

Note: The toolbox is the menu on the form design screen on the side of the screen. This menu consists of the following buttons from top to bottom: Mouse Selector, Wizard, Label, Text Box, Option Group, Toggle Button, Option Button, Check Box, Combo Box, List Box, Command Button, Image, Unbound Object Frame, Bound Object Frame, Page Break, Tab Control, Subform/SubReport, Line, Rectangle, and a More Controls button. Selecting one of these buttons and clicking one of the sections of the form will create that control wherever you click. This is the easiest way to create new controls. You can also customize what buttons are displayed on the toolbar by right-clicking on the toolbar and selecting Customize.

The record source for the Customers form is the Customers table. You can see the fields in the Customers table by clicking the Field List button on the toolbar. This displays the field list box as you can see in Figure 19.3. This shows the table or query the form is based on and the fields that are in that table or query.

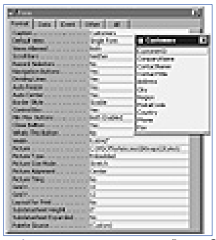

Figure 19.3 The field list box for the Customers form.

Now that you know which table the query is based on and what the form is designed to display, take a look at the data in that table. Close the Customers form and click the Tables tab in the Database window. Double-click the Customers table to open it in Datasheet view. You should see a screen similar to Figure 19.4. By scrolling to the right, you can see that all the information you saw on the Customers form is stored in this table in datasheet form. The Customers form is a good example of a form that makes tasks such as data entry much easier. Now that you know which table has the information you need and how you want that information to be displayed, create the form.

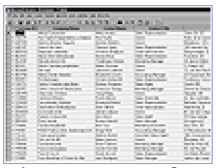

Figure 19.4 The Datasheet view of the Customers form.

Note: When you create your own forms, you should spend some time thinking about how you want your form to look and what you want your form to accomplish before you begin the actual steps to create it in Access. It is a good idea to sketch on paper what you want the form to look like and then use this as your blueprint when you actually create the form. This advance design work is very beneficial when you actually start to create the form.

KEYWORD SEARCH
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Advanced Search
PUBLICATION LOOKUP
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Title
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Creating a New Form

Now you are ready to create a new form. Make sure the Northwind database is open, select the Forms tab from the Database window, and click the New button. A dialog box appears, as shown in Figure 19.5, that asks you for details about the form you want to create.

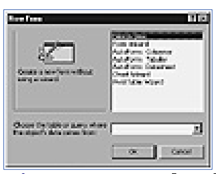


Figure 19.5 The dialog box that appears when you want to create a new form.

The dialog box asks you how you want to create the form, and to select the table or query upon which you want to base the form. Because the Customers form is based on the Customers table, select the Customers table from the dialog box drop-down list. Make sure the top selection is Design view and click OK to create a blank form that is linked to the Customers table. You should see a blank form view similar to the one shown in Figure 19.6. This blank form shows the property sheet open, as well as the field list box.

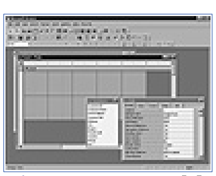


Figure 19.6 A blank form with the property sheet and field list box open.

The first thing you need to do is add the controls to the form. Looking back to Figure 19.1, notice that all the controls except the country control are regular text boxes used to display the data. The country control is a drop-down list box. You need to add all the fields from the Customers table as text boxes, except the country field. Before proceeding, make sure that the field list box is open and your screen is similar to Figure 19.6.

There are a couple ways to add all the controls to the form. To do this easily, click the Text Box button (see Figure 19.7) on the toolbox. Now you can click and drag each of the fields from the field list box to the detail section. For a quicker addition, you can drag the fields all at once. To do this, select the text box tool, click the first field in the field list box, and then scroll down. While holding down the Shift key, select the last field in the list. All the fields are selected. Click the first field in the field list box and drag to the detail section of the form. The cursor will change to a little field drag icon. Drop the icon in the upper-left corner of the detail section, allowing enough room for the text box and label to be displayed to the left of where you drop the icon. Your screen should be similar to Figure 19.7.

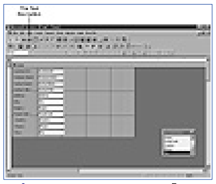


Figure 19.7 The new form after adding the Text Box controls.

You must delete the Country text box because you will be creating a list box for that field. Scroll down until you see the Country text box. Click the text box and press the Delete key. Now you need to move the controls around and resize them to look like the screen in Figure 19.1. Don't worry about getting things too perfect or matching Figure 19.1 exactly. Make sure to leave room for the `Country` control.

Note: To select a large group of controls at once, click your mouse pointer on a clear area of the form and drag a square around the controls you want to select. This is useful to size all the controls on this form at one time. After they are all selected, you can click and drag on one line of the box, and all the selected objects will change at the same time.

After you resize and rearrange your controls, your form design screen should be similar to the one shown in Figure 19.8. Now you add the `Country` field as a combo box to enable the drop-down list box to select the country from a list. To add the Country combo box, click the Combo Box icon (see Figure 19.8) on the toolbox, click the Country field in the field list box, drag it to the detail section of your form, and place it near its correct position. When you release the mouse button, the Combo Box Wizard loads, as shown in Figure 19.9. You want the combo box to look up the values for the country field from another table in the database, so leave the selection as it is and click Next.

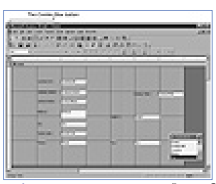


Figure 19.8 The form with all the controls added except the Country drop-down list box.

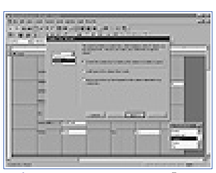


Figure 19.9 The Combo Box Wizard loads automatically when you place the control on a form.

This wizard walks you through setting up a drop-down list box for the Country field. The first screen, shown in Figure 19.9, asks you to tell Access where it should get the values you have to choose from in the list box. Because you want the values already stored in the table, click the Next button to continue.

Now, Access asks which table or query you want to base the values on. Select the Customers table, as shown in Figure 19.10. Click Next to continue.

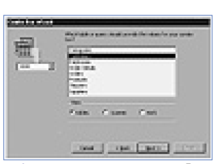


Figure 19.10 The first menu that appears when using the Combo Box Wizard.

The next screen, shown in Figure 19.11, asks you to choose which field in the table you selected should be used to make the list box. Again, choose the Country field, click the right arrow to add that field to the list, and click the Next button.

Figure 19.11 The second dialog box of the Combo Box Wizard.

Now Access asks you to select the width of the list box. The default should be fine, and you can always change it later. This is shown in Figure 19.12. Click Next to continue.

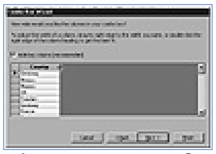


Figure 19.12 The third dialog box of the Combo Box Wizard.

Access asks whether you want to remember the value for later use or to store the value in the chosen field. You want the value to tell you what country the customer is from, so you want Access to store the value in the Country field. This is the default, as shown in Figure 19.13, so click the Next button.

Figure 19.13 The fourth dialog box of the Combo Box Wizard.

Access asks what name you want to give to the label for the list box. It picks Country as the name, as you see in Figure 19.14; click the Finish button to continue.

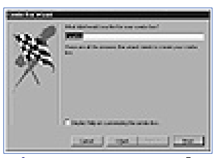
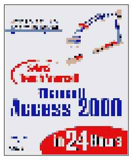


Figure 19.14 The fifth dialog box of the Combo Box Wizard.



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Now that you have created the main elements of the form, it is time to begin thinking about how the overall form looks. A title would look good at the top of the form. To do this, you must add a form header to place the title. To add a form header, select View, Form Header/Footer from the main menu. This adds the header and footer to the form. You will add a label with the title to the header. To do this, add an unbound label and enter the title you want to use. Click the Label button on the toolbox, and click the detail section at the top where you want the title to be. Access adds an unbound label control with a blinking cursor for you to add your title. Type the title `Customers` and press Enter. Change the font style to bold and the size to 12 by clicking the Bold button and Font Size box on the toolbar. You can manually resize the label box to fit the new font size, or you can double-click the border of the label box. That automatically resizes the box to fit your data. (See Figure 19.15 for the final results.)

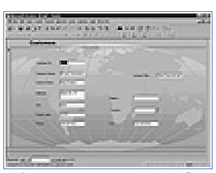

Figure 19.15 The new form with all the controls added.

The only thing left to add is the graphic behind the form. As is usually the case with Access, you have several ways to add graphics. The quickest way is to select the form by clicking the gray box with the black center that is located where the vertical and horizontal rulers meet. This selects the entire form.

Next, click the properties tool on the toolbar if the property sheet is not already open. Make sure the All tab is selected, and scroll down to the `Picture` property. Click in this field and then click the Builder button, the button with the three dots in it located next to the property field. Access asks you where the graphic you want to insert in your form is located. The default location with Office 2000 for the globe graphic is C:\Program Files\Microsoft Office\Bitmaps\Styles\Globe.wmf. If your setup is different, the graphic might be located elsewhere on your hard drive. Select Globe.wmf and click OK.

The form shows the globe graphic in the background, but it is too small. You need to change the `Picture Size Mode` property to Stretch to make the graphic to fill the whole form.

Note: You can add many types of pictures to your forms and reports. Access 2000 comes with a few default pictures, but you can also import your own. One thing to consider is that adding graphics takes up more system resources, and can slow down the speed of your database.

Your form should look like the form in Figure 19.1. You have successfully re-created the Customers form from the Northwind database. Exit your form. Access asks you whether you want to save your changes. Click the OK button, and Access asks you to give your form a name. Do not name it Customers because that overwrites the original form. Give it a different name that you will remember.

Another Form Example

Calculated expressions are one more type of control that is often used on forms. These are controls whose source is an expression instead of a field in a table or query, so they are unbound controls. None of the Northwind forms has an adequate example, so you will quickly create your own. Open a new form in Design mode and base the form on the Products table. Add the Unit Price field to the form as a bound control text box. Now select the text box button again, but instead of dragging a field onto the form, just click the form and create an unbound text box. You will calculate the total price of an item with 6 percent sales tax. In the Control Source property field in the property sheet, type the following formula: `=[unitprice] * 1.06`. The next field in the property sheet is the format field. Select `Currency` from the `Format` property on the Properties list. Now, take a look at the form in Form view. Your form should be similar to Figure 19.16.

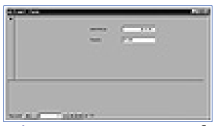

Figure 19.16 A form with a calculated control

Note: You also can add other options to the page header and footer. Remember from Hour 12 that page headers and footers are only visible when you print a form, not when you view it on the screen. In an unbound text box, you can use several Access functions, such as `=Date()` and `=Page()` to add the date, time, page number, filename, and other information. Look in Help under functions for more details and a list of functions.

Summary

This hour was devoted to studying forms and their design. You examined a form in the Northwind database and re-created it using a variety of controls and properties. You now should have a good understanding of the basics of forms and be able to create your own forms from scratch.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q What are subforms?

A A subform is a form within another form. It is usually used to show data from a table or query that has a one-to-many relationship.

Q What is a pivot-table form?

A A pivot table is an interactive table that performs the calculations you choose, such as sums and counts, based on how the data is arranged. You change layouts to analyze the data in different ways.

Q What is a graph form?

A You can add graphs to any form, using your own data or using data from a table or query.

Quiz

1. What are the six types of forms?
2. What are the three main types of controls?
3. What should you do before creating a form?
4. How do you add the current date or page number to a form?

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Hour 20
Creating Reports

Timothy Buchanan

This hour provides more detail on reports. You need to think about several things before you begin to design and create your first report. I discuss some of these issues and show you how to create a new form from scratch and add more advanced controls to your report. In the course of this hour, you re-create a report from the Northwind database. Topics covered this hour are

- Designing reports
- Sorting and grouping data
- Re-creating a Northwind report

Note: Controls and properties are the fundamental building blocks of forms, as well as reports. You must understand these important database items before you begin to design and develop reports.

Designing Reports

There are nine important steps in designing a report:

1. Determine what data is needed.
2. Design the appearance and function of your report.
3. Create the table or query to which the report will be bound.
4. Create a new report and bind it to the table or query.
5. Place the relevant fields on the report by using the proper controls.
6. Add other labels and calculated controls for other fields as necessary.
7. Modify the size, appearance, location, and size of the various controls.
8. Define sorting and grouping options.
9. Use graphics and other special effects to enhance your report.

These steps are very important to the proper design and development of your database. Next you will take a closer look at these nine steps. Then you will use these steps to re-create the “Sales Totals by Amount” report from the Northwind database.

Design the Appearance, Function, and Data Sources of Your Report

Reports display your data onscreen and on paper. Before you design a report, you need to know what information you want your report to display and what source you will use to get this information. For example, if all the information you need is in one table in your database, the report can be based on that table. If the information is in more than one table, you must base the report on a query. Designing the table or query properly is just as important as designing the report. If the report does not have an easy way to receive valid data, the report will be useless.

Determining What Data Is Needed and Creating a Query

You can use one table as the data source for your report only if that is the only place you can get the relevant data. If more than one table has the information you want to display in the report, select a query that contains all the information that is needed. If a query does not exist that contains the information you need, you have to build a new query specifically for that report. Reports can have only one source for information. In other words, reports can be based on only one table or one query. Creating a query that incorporates all the information from several tables is the only way to use information from more than one table in a report.

Creating a New Report and Adding Controls

After you determine the data you need displayed on the report, and you create the table or query that your report will use as the data source, you can create a blank report. Link the report to a table or query and begin adding controls. As discussed in Hour 9, “Displaying Data in Reports,” report controls can be bound, unbound, or calculated. The original source of the data displayed by a control is a good factor to help determine what type of control is needed. Use bound controls when the control gets its values from a field in the underlying table or query. Use unbound controls when the data the control displays does not exist anywhere in the database. Some examples of unbound controls are captions and titles. A calculated control uses an expression instead of a field to determine the data displayed. Report controls are the same as the controls that are used on forms. After you add the text boxes for your report, you can begin adding other controls as needed, such as labels and other text boxes. You can then change the size and appearance of the controls to fit the design you had in mind for the report.

Sorting and Grouping

Sorting data allows you to determine the order in which the data is displayed in the report. Grouping data groups relevant data together in the report. This allows you to easily identify the relationships between the groups. You also can use sorting and grouping to enhance readability and ease understanding of complex data. You can sort or group the data in the underlying query, but sorting in the report allows you to change the query without affecting the sort order in the report.

Adding Special Effects

A report with nothing but pages and pages of plain black and white text can be boring and unreadable. You can improve reports with graphic elements such as lines, boxes, graphics, and images. These elements enhance the readability and appearance of a report. You can use the rulers at the top and side of the page and the background grid to help with the placement of controls and objects to make the report look its best. Adding other sections, such as headers and footers, can also improve readability and appearance. These sections also are useful for displaying totals for grouped or sorted data.

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Designing and Creating a New Report

Now that you understand some of the basic ideas of reports, take a look at a report from the Northwind database and re-create it from scratch. This lets you see all the steps you need to consider when designing and creating your own reports. The report you will work with from the Northwind database is the "Sales Totals by Amount," which is shown in Figure 20.1.

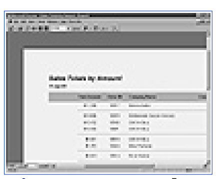

Figure 20.1 The Sales Totals by Amount report from the Northwind database.

The first step you need to take is to determine what you want the report to display. The "Sales Totals by Amount" report displays all the sales totals, the order ID, the company name, and a counter ID. The totals are sorted by the sale amount and grouped into $10,000 sections. The title and date appear at the top of the first page, the column names appear at the top of every page, and each page has the total sale amount for that page at the bottom of the page, along with the page number and total number of pages. You want to display only the sales that are more than $2,500. You also want only the sales that were shipped during 1998. You first need to create a query that gives you the information you need.

The information the report needs is stored in three places: The Customers table, the Orders table, and the Order Subtotals query. You need to combine these three objects to form the query for the report.

1. Open the Northwind database if it is not already open.
2. Select the Query tab and click the New button. Access displays the New Query dialog box.(See Figure 20.2.)

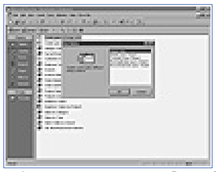

Figure 20.2 The dialog box Access displays when creating a new query.

3. The default choice is to create a new query without using a wizard. This opens a blank query in Design view.

4. Click the OK button to continue.

Access asks you which tables or queries you want the query to use. You know that the Orders and Customers tables and the Order Subtotals query are what you need.

5. Double-click each of these to add them to the query builder and then click the Close button.

Your screen should now look like Figure 20.3.

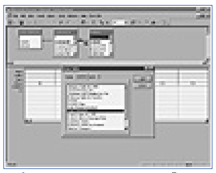

Figure 20.3 The Access Query builder with the tables and query added to create the new query.

Note: Notice that the tables already have the proper relationships displayed. The `CustomerID` field in the Customers table has a one-to-many relationship with the `CustomerID` field in the Orders tables, and the `OrderID` field in the Orders table has a one-to-one relationship with the `OrderID` field in the Order Subtotals query. You have to define your own relationships in all tables and queries that you design from scratch.

Now you need to add the fields you want to use in the report. You first need the sale amount from the Order Subtotals query.

1. Drag the `Subtotal` field from the Order Subtotals box to the first query line.

2. You only want the sales that are more than $2,500, so add the text `>2500` in the criteria field.

3. You want this field to have a different name in the report. Although you can change the label in the report design, it is easier to change the name at this stage. You want this field name to be `Sale Amount` instead of `Subtotal`.

4. To make the change, click in the Field row and type `Sale Amount:` before the name `Subtotal`, as shown in Figure 20.4. This displays all the sales totals from the Order Subtotals query that are greater than $2,500.

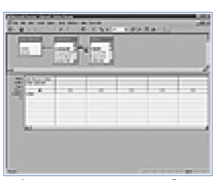

Figure 20.4 The new query with the first field added and formatted.

5. Now add the `OrderID` field from the Orders table, which is used to display the order ID on the report. To add this field, drag the `OrderID` field from the Orders table to the second query column.

6. Now, your screen should be similar to Figure 20.5.

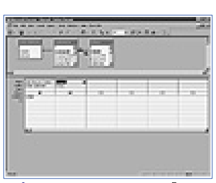

Figure 20.5 The new query with the first two fields added and formatted.

7. The next field you need is the company name, which is stored in the `CompanyName` field in the Customers table. Drag this field to the third query column.

Figure 20.6 displays the query with three fields entered.

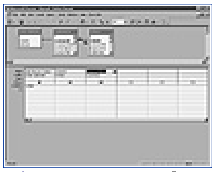

Figure 20.6 The new query with the first three fields added and formatted.

The fourth and final field you need on the report is a field that enables you to display only the orders that were shipped during 1998. This field is not displayed on the final report but determines what records the query returns. The date information is stored in the `ShippedDate` field in the Orders table.

8. Drag the `ShippedDate` field to the fourth query line.

9. You only want the orders from 1998, so you need to add a line to the `Criteria` field. To do this, you use the `Between…And` function. Type the following into the `Criteria` field: `Between #1/1/1998# And #12/31/1998#`. Using this criterion only displays the records with a ship date occurring during 1998.

10. Your screen should now look like Figure 20.7.

Figure 20.7 The new query with all four fields added and formatted.

Note: In Figure 20.7, the column with the `ShippedDate` field has been widened so that you can see the entire text of the Between condition. Similarly, the first column has been widened, so that you can see how Subtotal was renamed to Sales Amount.

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The query is now finished. To test the query, first save it, naming it `New Sales Totals by Amount`. Click the Run button on the menu toolbar (the button with the exclamation point). Your datasheet should look like Figure 20.8.

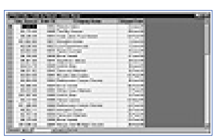

Figure 20.8 Datasheet displaying the information you designed the “New Sales Totals by Amount” query to display.

Now that you are satisfied that the new query displays the information you need for the report, you can design the report.

1. Close the new query, making sure that it was saved.
2. Click the Reports tab and click the New button.

   Access displays the New Report dialog box and asks you what table or query you want to link to the new report.
3. Select the “New Sales Totals by Amount” query and click OK.

   Access now displays a blank report that is bound to the new query. According to Figure 20.1, which shows the original report, the first thing we will add is the title and date that is displayed in the report header.
4. To add the report header, select View, Report Header/Footer from the menu.

   You can add both of these elements with an unbound text box placed in the report header.
5. Select the text box tool from the toolbox and click in the Report Header section.
6. Type `Sales Totals by Amount` in the label section.
7. Move the label to the top-left corner of the report header, change the font size to 18, and make the text bold (you can use the Formatting toolbar to do so).
8. Increase the size of the label box to display all the data. You can use a separate label to display the title, but using the label that is provided automatically to the unbound text box saves you a step or two.

9. Now, you want the text box to display the date. Add the text `=date()` to the text box.
10. Change the font size to 10 and make the text bold.
11. Resize and place directly under the title label, and align the left sides.
12. To match the date format of the original report, click in the `Format` property for the text box (located in the Properties dialog box under the Format tab) and select the `Medium Date` format.
13. Scroll down to the `Text Align` property and select `Left`.

Your screen should be similar to Figure 20.9. Now, you are ready to add fields to the Page Header and Detail section.

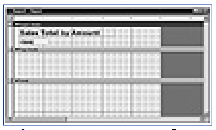

Figure 20.9 The new report with the first two fields added to the report header, displayed in Design view.

You add the data from the `Sale Amount`, `Order ID`, and `Company Name` fields to the Detail section and labels for these fields to the Page Header section. The labels act as column titles and are printed on each page. The data displayed on the text boxes is printed on each page of the report.

1. Select the text box tool from the toolbar and drag the three fields from the Field list box to the Detail section of the report. Select the labels for each of these text boxes and delete them, leaving behind just the text boxes.
2. Select the label tool, click in the Page Header section, and create three labels, typing in the name of each of the three field names `Sale Amount`, `Order ID`, and `Company Name`.
3. Change the label font to 10 and make the text bold for each label.
4. Line up the labels like the report in Figure 20.1 and align the text boxes in the Detail section below the labels.
5. Change the `Text Align` property of the Order ID text box to `Center` to display the information in the middle of the text box instead of the right.
6. Change the `Decimal Places` property for the Sales Amount text box to `0` in order to round up the values to the nearest dollar.
7. Add another label in the Page Header and type `Counter:` in the label.
8. Add an unbound text box in the Detail section directly under the Counter label and type `=1` in the text box. Select the label next to this text box and delete it.
9. To change the background color of the Page Header, click the Page Header section and click the button with the three dots next to the Back Color property in the Property sheet.
10. Select the light gray color for the background of the page header.

Your screen should now be similar to Figure 20.10.

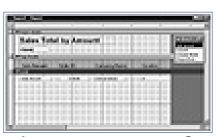

Figure 20.10 The new Sales Totals by Amount report with the Report Header, Page Header, and Detail sections added and formatted.

11. You want to sort the sale amount in descending order and group the sales amount in $1,000 increments. To do this, select the Sorting and Grouping button on the toolbar.
12. In the top line under Field/Expression, click the drop-down list and select Sale Amount.
13. To the right under Sort Order, select Descending to sort the values in descending order.
14. You want a line to separate each group, so select Yes for Group Footer in the Group Properties field in the lower section of the Sorting and Grouping box. This is shown in Figure 20.11.

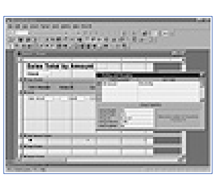

Figure 20.11 The new Sales Totals by Amount report with the Report Header, Page Header, Detail, and Sales Amount Footer sections added and formatted.

15. You want to group on an interval of $1,000, so select Interval for the Group On property and select 1000 for Group Interval.

16. Add a horizontal line running the width of the report in the Sale Amount footer using the Line button from the toolbox.

Your screen should be similar to Figure 20.11, which shows the Sorting and Grouping dialog box open. You can partially see the horizontal line in the group footer. Look behind the Sorting and Grouping dialog box, about two thirds of the way down. To see the screen without the dialog boxes in the way, refer to Figure 20.12.

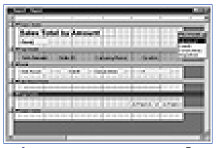

Figure 20.12 The new report with all the controls added and formatted.

17. The next step is to change the `Running Sum` property of the Counter unbound text box to `Over All`. The property is found on the Data tab of the control's Properties window. This will keep the counter number set up properly, with the number consistent over the whole report, not renumbering on each separate group.

18. The last thing you need to do is add the page number box in the Page Footer.

19. Add an unbound text box to the lower-right corner of the Page Footer and delete the label.

20. Add the following text to the Control Source property for this text box: `="Page " & [Page] & " of " & [Pages]`.

This uses the concatenation function, represented by the "&" operator, to add the words `Page` and `of` to the current page number and total page numbers.

21. Change the size of the font of this text box to 10, and line it up all the way to the right of the Page Footer. Set the `Text Align` property to `Right`.

22. Add a horizontal line to the entire width of the Page Footer. Click the line and change the Border Width property to 3 and the Border Color to light gray.

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Now, the report is finished and ready to preview. Your screen should look something like Figure 20.12.

Save the report as `New Sales Totals by Amount Report` and select the Print Preview view. Your new report should be similar to the one shown in Figure 20.13.

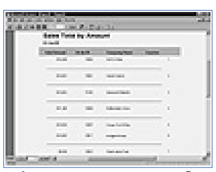

Figure 20.13 The new report shown in Print Preview.

Congratulations—you just designed and created your first report, a complex combination of several tables and queries that display exactly the information you need to know.

Summary

This hour provided more detail on reports. I discussed several steps you need to take before you can design and create a report. You re-created a report from the Northwind database from scratch while learning many of the design issues you need to think about when designing and creating reports.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What is a good way to learn more about creating reports?**

A By doing exactly what you did in this hour. Pick a report that does something similar to what you want to do and examine all the parts of that report. After you get an idea of how the report works, you can use that information to help you create a new report.

Q **What other calculations or expressions can you add to a report?**

A Many more calculations and expressions can be added, such as a running sum, average, and other arithmetic calculations.

Quiz

1. What are the fundamental building blocks of reports?
2. What kind of special effects can be added to a report?
3. What are the nine steps in designing a report?

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Hour 21
Creating Macros

Timothy Buchanan

This hour introduces macros. Macros help automate tasks that are performed frequently or repetitively. You can use macros by themselves or in combination with other objects in your database. You can automatically run macros using events, such as when a button on a form is clicked. How macros work and how you integrate them into your databases is the focus for this hour. Topics covered this hour are

- What a macro is
- The uses of macros
- The macro window
- Creating and editing macros
- Running macros
- Conditional macros
- Debugging macros
- Events
- Self-executing macros
- Integrating macros and forms

What Is a Macro?

A macro is an Access object that executes certain tasks or a series of tasks. Each of these individual tasks are called *actions*. Access 2000 allows you to select and perform dozens of different actions in a macro.

When you run a macro, Access uses the objects and data that were specified in the actions of the macro to execute those actions in the sequence in which they are listed. For example, you can design a macro that automatically opens two forms that are used often in your database. Your macro would have two actions that tell Access to open the forms in the order you list them. You also can use macros for other functions, such as validating complex data, creating custom menu bars, or triggering other macros.

Note: Macros can change the data in your tables! Make sure you make a backup copy of your database before you attempt to create your own macros.

The Uses of Macros

You can use macros for any repetitive task or series of tasks you do in your database to save time and effort. Any task that is repetitive or performed often is a good candidate for implementing as a macro. Macros also add accuracy and efficiency to your database by performing the actions you specify in the exact same way every time they are run. You can use macros to perform a wide variety of tasks such as

- Open a table, form, query, or report in Design view or Datasheet view.
- Open multiple forms and reports together. For example, a form can have buttons linked to macros to automatically print a report that is based on the current form. You also can use buttons to open one form that is related to the form you are currently using.
- Set or change most form and report properties and the properties of their controls using macros.
- Close tables, forms, and reports that are open.
- Run action queries.
- Move data between different tables.
- Execute any commands from the Access menu bar.
- Set values of controls on forms and reports. Using the results of calculations or using a value from another table, a macro can set the value in the form or report.
- Perform certain actions when you click a command button or press a key.
- Move, minimize, maximize, size, or restore any window.
- Display information, such as warnings, to the user.
- Rename database objects.
- Start other applications.

The Macro Window

The Macro window is the graphical design workplace used to create macros. It is very similar to the design window of other Access objects. To open the macro design window, click the Macro tab in the Database window, select a macro from the list, and click the Design button. Figure 21.1 shows the list of macros in the Northwind database.

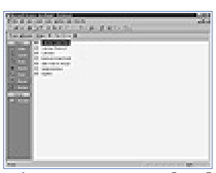

Figure 21.1 The list of macros available in the Northwind database.

Figure 21.2 shows the Suppliers macro from the Northwind database displayed in Design view. The Macro Name column is used when creating macro groups. Macro groups are used to group a series of actions into a single entity. Whenever a macro group is executed, Access will perform all of the actions in that group. A macro group ends at the next line without an empty macro name. For example, the `Add Products` macro group begins with the `Echo` action and ends with the `GoToControl` action (it actually ends two lines past that, but neither of those lines do anything, they're just comments).

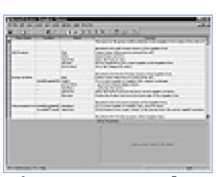

Figure 21.2 The Suppliers macro from the Northwind database opened in Design view.

To create a new macro, click the Macro tab on the Database window and click the New button. Figure 21.3 shows a blank macro in Design view. Notice that the design window is separated into four parts. The menu and toolbar are located at the top of the screen, similar to the other Access objects. The upper section of the macro window is where the macro is designed. This section has two columns, Action and Comment. You use the Action column to add the actions for each step of the macro. You use the Comment column to add a description of each action. The data in the Comment column is ignored by Access and is a good place to document the actions of a macro (see Figure 21.2). You can make comments about each action of the macro for future use. Documenting your code is an important programming technique.

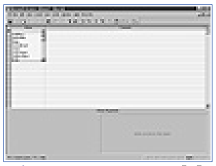

Figure 21.3 A blank macro opened in Design view.

Note: You can display the two columns missing from the default macro Design view (Macro Name and Condition) by selecting View, Macro Name and View, Condition. You also can click the icons on the toolbar to view these sections. Conditional macros are discussed in the "Conditional Macros" section below.

The lower section of the macro window specifies the arguments for each action. You need to provide information for most actions before Access can perform them. Access uses these arguments to get more information about how to perform each of the actions. In Figure 21.4, the Customer Labels Dialog macro from the Northwind database is open, and an action that opens a report is selected. Notice that the Action is OpenReport. The lower section lists the arguments for the OpenReport action. The Report Name is the report to be opened. In this case, the Customer Labels report is specified. The View is the view in which the report is to be opened. In this case, the Customer Labels report is to be opened in Print Preview. Each action has different arguments it needs before it can execute properly.

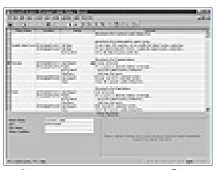

Figure 21.4 The Customer Labels macro from the Northwind database is opened in Design view, and the OpenReport action is selected.

Note: You can easily and quickly move between the upper and lower sections by pressing the F6 key.

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Creating and Editing Macros

When creating a macro, you must use both sections of the Design window. After you add the actions and arguments, you can save the macro to use another time.

Adding Actions

There are several ways to add an action. You can enter the action name directly in the Action column of the macro window. You can also select an action from the drop-down list box in the Action column. The next step is to add a description of the action in the Comments column. Adding a description is not mandatory but is considered a good programming practice. Now, you must specify the arguments for the action listed in the Action column. After the action is selected in the Action column, the lower section displays the arguments that you can select for that specific action. Each macro action has a different set of arguments. You can manually type a value into the argument or, where appropriate, select a value from a drop-down list.

Another feature that makes creating macro actions easy is the ability to drag and drop items from the Database window onto the Macro Design window. If you drag a table and drop it onto the macro Design window, the `OpenTable` action is added to the macro and the name of the table is placed in the appropriate argument value for this macro. Most of the other object types (queries, forms, reports, pages, and modules) have similar `Open` macro actions. If you drop an existing macro onto the Design window, the `RunMacro` action is added.

You can add more than one action to a macro. Access performs the actions in the order in which the actions are listed. Simply use the next empty line in the upper pane of the macro Design window.

Editing Actions

When you have a macro with multiple actions, you might need to change the order of the actions. To move an action, select the action by clicking the row selector to the left of the action name. Next click the highlighted row and drag it to where in the macro you would like that action to be performed. You can also delete macro actions. Click the row selector to the left of the action name, and press the Delete key or select Edit, Delete Rows from the menu. Macros are run in the order in which they are listed in the macro screen, from top to bottom. If you call another macro from your original macro, the macro you call is run in its entirety, and control is returned to your original macro. The remaining macro actions are then performed.

Saving Macros

You must save a macro before you can run it. If you attempt to run a macro that was not saved, Access asks you whether you want to save it. After the macro is saved, it is listed with the other macros under the Macro tab in your Database window.

Tip: The easiest and fastest way to save a macro is to press the F12 key and type the macro name.

Running Macros

After you create a macro, several different places in Access allow you to run the macro. You can run the macro from the Macro Design window by clicking the Run button in the toolbar, which has an exclamation point icon. You also can choose Run, Run from the Design menu. Another way to run a macro is from the Database window. Select the macro from the macro list under the Macro tab in the Database window, and click the Run button. You can also double-click the macro you want to run.

Note: You also can run a macro within another macro. The action RunMacro enables you to run any other macro in your database.

Conditional Macros

In some cases, you might want to perform a certain action or actions only if a specific condition is true. For example, you might want to display different information to the user depending on what value the user enters. In these cases, you can use a condition to control the flow of a macro.

A condition is a logical expression. In other words, it can only be true or false. When the condition is true, the macro executes the action and subsequent actions having ellipses in their Condition column; when the condition is false, the action is not executed and execution continues at the next action which does not have ellipses in its Condition column (more on the ellipses in a moment). The Customer Labels Dialog macro from the Northwind database, displayed in Figure 21.5, has several actions that depend on the condition of the `PrintLabelsFor` variable.

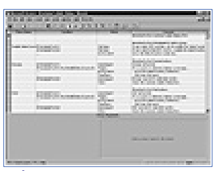

Figure 21.5 A macro with Conditions.

To add a condition to a macro, you must have the Condition column visible. Click the Condition button on the toolbar to view this column. You enter the conditions for the actions that require them in the Conditions column in the Macro Design window. If the condition is true, Access performs that action. Access can also execute a series of actions if the condition is true.

Type an ellipses in the Condition column of the actions that immediately follow that condition. The ellipses is shown in the Customer Labels Dialog macro from the Northwind database in Figure 21.5. When you run a macro, Access examines each expression in the Condition column and determines whether the condition is true or false. If the expression is false, Access ignores the action and moves to the next row that does not have an ellipses. If the expression is true, Access performs the action that is beside the expression and all the following actions with an ellipses in the Condition column. If the Condition column is blank, Access performs that action and continues to the next expression, where the cycle continues.

For example, note the actions in Figure 21.5 having the condition `[PrintLabelsFor]=2 And IsNull([SelectCountry])`. This condition will be true if the value of `PrintLabelsFor` is 2 and there is no value for `SelectCountry`. In this case, the action on the line containing the condition is executed (`MsgBox`). Likewise, the two actions following this one, `GoToControl` and `StopMacro` are executed. If the condition is false (either `PrintForLabels` is not 2 or there is a value in `SelectCountry`), execution jumps to the line which has a Condition column of `[PrintLabelsFor]=2`. Note that this line would have been evaluated after the previous lines were executed but for the `StopMacro` action.

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Debugging Macros

Access provides two tools to help you troubleshoot problems in your macros: single stepping and the Action Failed dialog box. Using Single Step mode allows you to see how each line of the macro operates. The Action Failed dialog boxsimple informs you that your macro had a failure, and shows you some information about the line that caused the failure.

Single Step

You use single-step mode when you receive unexpected results from your macro and you want to examine the macro's actions more carefully. Single stepping moves through the macro's actions one step at a time, pausing between each action. Single stepping allows you to take a look at the result of each action and determine what action or actions are causing the incorrect results. To use the single-step mode, click the Single Step button on the toolbar (see Figure 21.6) or select Run, Single Step. This is a toggled item, meaning that you'll stay in single step mode until you click the toolbar button or use the menu item again. Run the macro as you usually do by clicking the Run button on the toolbar. The Macro Single Step dialog box, shown in Figure 21.6, appears.

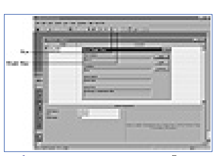

Figure 21.6 The Macro Single Step dialog box.

You have three options when single stepping:

- Step performs the action listed in the dialog box. If no errors occur, the next action appears in the dialog box.
- Halt stops the execution of the macro and closes the dialog box.
- Continue turns off the single-step mode and continues to run the remainder of the macro.

Note: Turning on single-step mode opens all macros in the single-step mode. You can't limit the effect to just one. Turn off single stepping if you want to run any macros as usual.

Action Failed Dialog Box

When a macro is run and an action causes an error, an error message appears. The error message appears in a dialog box that looks just like the macro single step box, but the only option available is the Halt button. Choose Halt and return to the macro window to correct the problem.

Events

Another way that you can run macros is to base the activation of a macro on an *event*, which is the result of some user action. An event can occur when a user clicks a button in a form, closes a report, moves between records in a form, and many other cases. Access databases are event-driven. Access objects respond to many different events. Access 2000 has eight different groups of events.

- Data events occur when data is entered, deleted, or changed, or when the focus moves from one record to another.
- Error and timing events are used for error-handling and synchronizing data.
- Filter events occur when you apply or create a filter on a form.
- Focus events occur when a form or control loses or gains focus or becomes active or inactive.
- Keyboard events occur when you type on the keyboard or when you send keystrokes using the SendKeys action.
- Mouse events occur when a mouse action happens.
- Print events occur when a report is printed.
- Window events occur when you open, resize, or close a form or report.

You can trigger a macro when a user performs any of the approximately 50 events that Access recognizes. Access recognizes these events through the use of special properties in forms, reports, and controls. There are no event properties in tables or queries.

For example, to run a macro that displays a report when the user clicks a button on a form (which raises the `On Click` event), follow these steps:

1. Create a new macro using the steps outlined earlier. Add a single action, `OpenReport` and set the Report Name and View arguments appropriately (remember that you can also drag the report from the Database window to add the action quickly). The View argument determines whether the report will be printed, opened in print preview mode, or opened in its Design window. Select `Print Preview` for this example.

2. Close the macro window, saving the new macro as `Print Report`.

3. Create a new blank form using the Design button on the forms tab of the Database window. Add a command button to the form (if the Command Button Wizard appears, click Cancel to dismiss it).

4. Right-click the command button and select Properties from the shortcut menu. On the Properties window, go to the Event tab. Click in the box next to On Click.

5. Drop down the list box for this property and scroll until you find `Print Report`. Select this entry and close the Properties window.

6. Switch to Form view and click the button. The report you specified in step 1 should display in the Print Preview window. If the Macro Single Step appears, you've left Single Step mode turned on. Click Continue to turn it off.

Self-Executing Macros

A good example of a macro that uses an event to trigger the macro execution is a self-executing macro. The most common self-executing macro is the AutoExec macro, which is automatically executed every time you open your database. To create the AutoExec macro, simply create a macro that you want to run every time you open the database. Save the macro and name it AutoExec. Every time you open the database, the AutoExec macro runs, which is useful if you want to display an opening screen to your users or open a main switchboard menu.

Note: To bypass the AutoExec macro, hold down the Shift key as you select the database in the Open Database dialog box and continue holding it while the database loads.

Integrating Macros and Forms

When you use a form in your database, Access recognizes certain events that occur on the form. Some events that Access recognizes are moving from one record to another or double-clicking a control. You can use macros on forms to respond to these types of events. Form events have corresponding event properties. Macros specify how each control or form responds to any event. The form or control property is linked to the macro. When creating a response to an event, you must first identify the control or form event that the macro responds to. If the macro you want to link to this event does not exist, you have to create it first. Next set the event property to the name of the macro. You can use the Macro Builder to create a macro, and it sets the event property automatically. You can use the Macro Builder for any event property. To use the Macro Builder, select the control property you want to change and click the small button with the ellipses (…) on it. Select the Macro Builder button, and you can create and save the macro without leaving the form or report you are currently working on. Access help offers more information on the Macro Builder.

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Summary

This hour introduces the topic of macros. How macros work and how you can integrate them into your databases is the focus of this hour. This hour covers what macros are, as well as when and why to use them. Macros are a very broad topic, owing to the many available macro actions. Also, macros are quickly being replaced with Visual Basic for Applications code. However, this hour is a good introduction to macros and how to use them.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **Can a macro cancel an event?**

A Macros that are executed from an event that is cancelable, such as the `BeforeUpdate` event, can use the `CancelEvent` action to cancel the event. In the case of `BeforeUpdate`, using the `CancelEvent` action will cause the update to be canceled.

Q **Can you do anything more advanced than macros?**

A Yes, you can, using Microsoft's Visual Basic for Applications. Much of what you can do with macros, and even more, can be done with code, and code has the advantage of being faster and more powerful. In addition, you can trap any errors that occur.

Quiz

1. What is a macro?
2. Why should I use a macro?
3. What are events?
4. Why use events to trigger macros?

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Part VI
Additional Topics

Hour

Hour 22
Exchanging Data with Word 2000, Excel 2000, and Other Applications

Craig Eddy

You're almost done. You've made it to Hour 22 in the quest to teach yourself Access 2000. You've learned all about using, extending, and creating an Access 2000 database. Now it's time to learn how to use that database in some real-world situations.

This hour covers the basics of using Microsoft's Office Links. These are built-in wizards that assist you in using information contained in one Office application in a different Office application. The Office Links included with Access 2000 are Merge It with MS Word, Publish It with MS Word, and Analyze It with MS Excel. You'll also learn about the Label Wizard for generating labels, and about exporting data from Access 2000 to other file formats, or even other database systems.

Note: You must have the appropriate Office 2000 applications installed on your computer to use the Office Links.

In this hour I'll use the Northwind database that's included with Access 2000 as a sample database. If you want to follow along with the examples in the text, open that database now.

Using Access Data for Microsoft Word Mail Merges

Perhaps the most useful tool in the Microsoft Office suite is Word 2000's mail merge. Performing a mail merge involves creating a Word document that contains special merge fields and then combining this document with a data source. The data source is used to replace the merge fields with real data. A separate document is created for each record in the data source.

The Merge It with MS Word Office Link can be used for data contained in tables or returned by a query. You cannot use this Office Link with forms and reports. If you're using SQL Server as your back-end database, this Office Link works with Tables, Views, and Stored Procedures.

To use the Merge It Office Link, follow these steps:

1. Activate the database window and select the table or query that will provide the data for the mail merge. For our example, select the Customers table.

2. On the Tools, Office Links flyout menu, select the Merge It with MS Word menu item. The Office Links menu item is on the full menu. If your Tools menu resembles Figure 22.1, click on the last entry in the menu to display the full menu. Next click on Office Links and select the Merge It with MS Word menu item.

Figure 22.1 The "compact" Tools menu, missing the Office Links menu item.

Alternatively, you can simply click the Merge It with MS Word Office Link toolbar button, found on the standard Database toolbar.

3. The Microsoft Word Mail Merge Wizard appears as shown in Figure 22.2. This dialog box allows you to choose between merging with an existing document or creating a new document. For now, choose to create a new document and click OK.

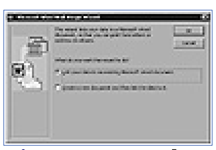

Figure 22.2 The Microsoft Word Mail Merge Wizard.

4. Microsoft Word loads a new document and turns on the Mail Merge toolbar (as you can see in Figure 22.3). In this figure, I have clicked the Insert Merge Field to drop down the list of available merge fields. As you can see, this list matches the fields available in the Customers table.

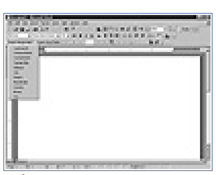

Figure 22.3 Microsoft Word prepared for the Customers table mail merge.

5. Create the document as you normally would in Microsoft Word. Insert the merge fields from the Customers table where appropriate in the document. You do this by clicking the field's name from the Insert Merge Field dropdown menu.

6. After you've finished creating the document, you should save it for future use.

7. To see the merged document, click the View Merged Data button (the one labeled ABC) that resides to the right of the Insert Word Field button on the Mail Merge toolbar. The data from the Customers table is merged with the document, replacing the merge fields with the appropriate data. The example document I created is shown in Figure 22.4.

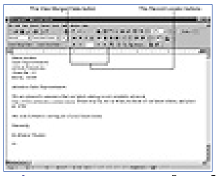

Figure 22.4 The final merged document.

8. You can use the record locator buttons on the Mail Merge toolbar to display other records in the merge document. To print the merged document, use the File, Print menu.

Now that you've created a merge document for the Customers table, you can use this file for future mail merges by choosing Link your data to an existing Microsoft Word document option on the initial Mail Merge Wizard dialog. When you do so, Access will present you with a Select Microsoft Word Document file open dialog box. Simply locate the appropriate file using this dialog, and then continue at step 5 above.

You can also use the Save As/Export feature, discussed later in this hour, to save the data in a table or query into a form Word 2000 can use for mail merge. Doing so, however, does not allow you to select the document to be used for the merge, nor does it allow you to create a new document.

Publishing Access Components Using Microsoft Word

The Publish It with MS Word Office Link allows you to quickly create a Word document from the datasheet view of tables, queries, and forms. It can also create a document from a report. This Office Link creates a file in the Rich-Text Format (RTF) and immediately launches Word 2000 with this document.

Using this Office Link is simple. Simply select the table, query, form, or report you want to use as the source for the new document. Next use the Tools, Office Links, Publish It with MS Word menu item, or click the Office Link toolbar dropdown and select the Publish It with MS Word toolbar button.

Access will choose the name for the file based on the name of the object. If the filename already exists, Access will ask you whether you want to replace the existing file. If you answer no, a File Save dialog will appear allowing you to choose a different name or folder for the file. If you answer yes, the existing file will be replaced with the new one.

For tables, queries, and forms, the Publish It Office Link will produce a document that uses a table to display the data. For a report, the document will closely resemble the printed report, except that charts embedded in the report will not be ported to the Word document. For SQL Server databases, you can also use this Office Link with Views and Stored Procedures.

Figure 22.5 shows the document produced when the Publish It Office Link was used on the Sales by Category query.

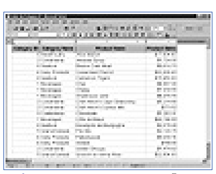

Figure 22.5 The results of the Publish It Office Link used with the Sales by Category query.

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Analyzing Access Data Using Microsoft Excel

The final Office Link is the Analyze It with MS Excel Office Link. This Office Link allows you to transfer your tables, queries, forms, and reports (and Views and Stored Procedures for SQL Server databases) to an Excel spreadsheet. Most of the formatting from the original object is preserved in the spreadsheet. Forms are saved with their Datasheet views. If you have grouping levels in your reports, they are saved as outline levels in the spreadsheet.

To use this Office Link, select the component you want to transfer to Excel. Use the Tools, Office Links, Analyze It with MS Excel menu item, or click the Office Link toolbar dropdown and select the Analyze It with MS Excel toolbar button. Like the Publish It Office Link, Access will choose the name for the file based on the name of the object. If the filename already exists, Access will ask you whether you want to replace the existing file. If you answer no, a File Save dialog will appear allowing you to choose a different name or folder for the file. If you answer yes, the existing file will be replaced with the new one.

Figure 22.6 shows the Excel spreadsheet produced when the Sales by Category report was used with the Analyze It Office Link.

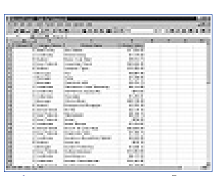

Figure 22.6 The results of the Analyze It Office Link used with the Sales by Category report.

Using the Label Wizard to Produce Labels

As you've seen so far in this hour, Access 2000 is full of features that assist you in using the data entered into your databases. This section covers another very useful feature, the Label Wizard. The Label Wizard is a report generator that can create a variety of printed labels from the data in a table or query. Typically labels are created for mailing purposes. However, you can just as easily create product labels, tape labels, or any other type of label you want.

Note: The table or query to be used as the source of data must exist prior to starting the Label Wizard.

To create a new set of labels using the Label Wizard and the Northwind database, follow these steps:

1. Open the Northwind database, activate the Database window, and select the Reports item in the Objects group.

2. Click the New button to open the New Report dialog, shown in Figure 22.7.

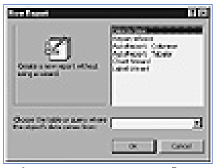

Figure 22.7 The New Report dialog box.

3. Select Label Wizard in the list box at the right side of the dialog.

4. In the drop-down list box at the bottom of the dialog, select the table or query that contains the data to be used for the labels. In this example, select Customers.

5. Click OK to launch the Label Wizard. The first dialog of the wizard, shown in Figure 22.8, appears.

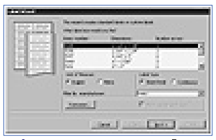

Figure 22.8 The initial dialog of the Label Wizard.

6. Select the label style you're using or click the Customize button to create a new label style. The default styles available are the styles for the Avery brand of labels. To see which labels are available from a different manufacturer, use the Filter by manufacturer dropdown list. For this example, select `5164` from the default list of labels. Click Next when you've chosen the proper label style.

> **Note:** If you have created custom labels and check the box labeled Show Custom Label Sizes, the standard labels will not appear in the list of available labels. Only the custom labels will appear. Simply clear the check box if you need to use a standard-sized label.

7. The font and color dialog appears. Here you select which font to use, what size it should be, the color of the text, and a few other attributes. A sample showing how the label text will look appears at the left. Click Next when you're ready to move on.

8. The next dialog, shown in Figure 22.9, is where you'll do the field layout for the label. Select the field in the list of available fields and click the > button to move it to the prototype label on the right side of the dialog. In the prototype label, you can type static text as well as use the Ctrl+C, Ctrl+X, and Ctrl+V copy, cut, and paste shortcut keys. After the label is laid out properly, click Next to continue.

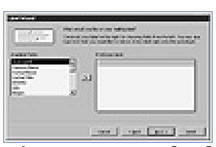

Figure 22.9 The label layout dialog box.

9. The next dialog is where you choose how to sort your labels. This is useful if you're doing bulk mailings, for example, because the postal rates are lower for sorted mail. Select the field or fields you want to sort on and move them to the Sort By list by either double-clicking them or click the > button. You can add all fields by using the >> button. To remove a field, select it in the Sort By list and click <. To remove all fields, click <<. When you're finished here, click Next to continue.

10. This is the final dialog. Name for the report and instruct Access what to do when you click Finish. For our example, change the name to `Customer Labels (5164)` and click Finish. The resulting report is shown in Figure 22.10.

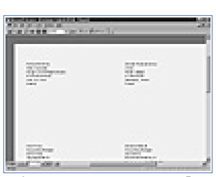

Figure 22.10 The finished Customer Labels (5164) report.

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Exporting Data to Other Sources

In addition to the means already discussed in this hour, Access 2000 provides a way to manually export data from your database to an external file or database. The available recipients for this export feature depends on the options that you installed when Access 2000 was installed. Likewise, different components have different possible export capabilities. For example, forms and reports cannot be exported to other database systems, but can be exported to Excel files and other types of files. Tables and query results can be exported to other database systems as well as Excel files.

Note: If an external file type or database is not available when you follow along in this section, it simply means you haven't installed that option. To do so, return to Hour 2, "A Quick Tour of Access 2000," for instructions on installing Access.

To export an entity to an external file, follow these steps:

1. Select the entity in the Database window.
2. Use the File, Export menu item, or right-click the entity's name and select Export from the shortcut menu.
3. The Export Entity Name To dialog shown in Figure 22.11 opens. In this dialog box you specify how and where you want to save the entity.

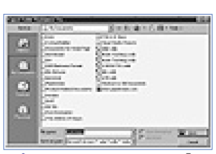

Figure 22.11 The Export To dialog box.

4. Select the type of file to which to save the entity using the Save as type drop-down list box at the bottom of the dialog. Open the list box to see which types are available on your system. Select the type desired.
5. Use the top portion of the dialog to specify the location and filename for the file to export to and click Export.

New Term *ODBC* refers to an Open Database Connectivity. ODBC defines a standard means of connecting to an external data source. The interface to the outside world is identical for every ODBC-compliant database. ODBC drivers, which perform the actual access to the data, are built for each ODBC-compliant data source.

If you're exporting a table or query to another database using ODBC, follow the above steps through step 4, and then continue as follows:

1. Select `ODBC Databases()` in the Save as Type drop-down list.

2. In the Export dialog that appears next, specify a name to use for the entity in the destination ODBC database. Click OK.

3. The Select Data Source dialog appears. Specify or create an ODBC data source name for the database you're exporting to. The choices of databases and ODBC drivers available varies greatly from system to system.

4. Click OK and the data is exported to a table on the specified data source. If any errors occur during this process, you will receive the appropriate message boxes informing you of the problem.

Caution: Different database systems have different ways of representing data, including different data types. There is no guarantee that what you end up with in the target database is identical to the Access version. For example, most databases don't sport an `AutoNumber` data type, causing any `AutoNumber` fields to be exported as plain old `Integer` data.

Access can also export to a variety of Internet formats, including creating Web-based Data Access Pages based on your database. Publishing data on the Web is the subject of Hour 24, which is appropriately titled "Access 2000 and the Web."

Summary

Hopefully by now you've discovered a wealth of ways to put the data in your database to good use. This hour has shown you how you can create Word and Excel documents from your data, how to create labels using the Label Wizard, and even how to export your data to just about any other file or database.

Access 2000 really removes the limits on what you can do with data after it's placed in your database. In other words, the data is not stuck in the database serving little to no purpose. You can always act upon and use your data in the way that best matches how you operate.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A, "Answers to the Quiz."

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Q&A

Q Can other users share the merge documents that I create with the Merge It Office Link?

A Yes, as long as the other users have a database with the same name, and it contains the same table or query (depending on which you used as the source for your merge).

Q After I create a merge document and perform a mail merge, what can I do with it?

A You can merge to a new document, the printer, or to email. If you merge to email, you can specify which field in the merge data is to be used as the recipient's email address.

Q How are these wizards created? Can I create my own?

A Almost all of the wizards you'll find in Access 2000 are written using the VBA (Visual Basic for Applications) programming language that's included with Access 2000 (and the entire Office 2000 suite). If you know how to program with VBA, you can most definitely write your own wizards. Unfortunately, to my knowledge the source code for the Microsoft-provided wizards is not available outside of Microsoft.

Q I have an existing database system to which I'd like to export data. Where can I find the ODBC drivers for this system?

A Access 2000 ships with quite a few ODBC drivers. If the driver you're looking for isn't currently on your system (use the 32-Bit ODBC Control Panel applet to find out which drivers are installed), try running the Access 2000 setup again to see whether it's available within Access 2000. If it isn't, contact the database vendor to see if they have a 32-Bit ODBC driver available. Chances are most commercial database systems have such a driver available. You can also check Microsoft's Universal Data Access Web site at http://www.microsoft.com/data for additional drivers.

Quiz

1. What is the main difference between the Merge It and the Publish It Office Links?
2. When using the Merge It Office Link, must the document to be merged with already exist?
3. What size labels can be created using the Label Wizard?

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Hour 23
Database Administration

Timothy Buchanan

This hour discusses the topic of database administration. Above and beyond the design of your database and the overall scheme of how it works, you need to know several things about how to manage your database. Knowing how to compact and repair your database is very important. Access 2000 provides several utilities that make it easy to manage your database. Topics covered this hour are

- Compacting a database
- Repairing a database
- Backing up a database
- Encrypting a database
- Converting a database
- Securing a database

Compacting a Database

When deleting records from a table, or deleting objects such as tables, queries, forms, or reports from your database, Access does not reduce the size of the database file. Consequently, when the database becomes fragmented, it does not use drive space efficiently. Access does not reduce the size of the database every time you delete something because that can be a very time-consuming activity. When you reduce the size of a database file, all the objects in the database are recopied. This can take considerable time, which greatly affects the speed at which your database operates. Access provides a utility that allows you to specifically compact the database and eliminate wasted disk space. The only way to easily tell if your database needs to be compacted is if the current size of your database is much larger than its previous size, and few objects have been added to it since.

To compact the database that is currently open, select Tools, Database Utilities, Compact & Repair Database from the menu, as shown in Figure 23.1.

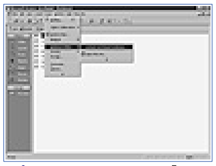

Figure 23.1 The menu option to compact a database that is currently open.

To compact a database that is not currently open, first make sure no databases are open in Access, then select Tools, Database Utilities, Compact & Repair Database from the menu as shown in Figure 23.1. Specify the database you want to compact in the Database to Compact From dialog box, which is shown in Figure 23.2. Click Compact to continue. In the Compact Database Into dialog box, specify the name of the compacted database and where on your drive you want it stored. Access will create an entirely separate copy of the existing database, storing it where you specify in the Compact Database Into dialog box. Click Save to continue; Access compacts your database and writes the compacted database to the location you specified. This new copy will have all of the same data and objects, but won't have the fragmented and wasted disk space.

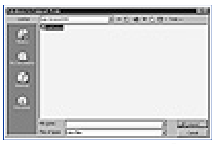

Figure 23.2 The Database to Compact From dialog box is where you select the database you want to compact.

Note: You can use the same name as the original database, but make sure to have a backup copy of your database. If you choose the same name and location as the original database, Access overwrites the original database with a compacted version.

Compacting a database from a previous version of Access does not convert it to Access 2000 format.

It is usually a good idea to compact a frequently used database on a regular basis, especially those databases where a large number of records or objects is deleted on a regular basis, such as inventory databases.

Problems When Compacting a Database

Compacting a database usually consists of waiting for Access to finish the job. Sometimes a problem can occur. There are a few reasons why a database cannot be compacted.

If you do not have enough storage space on your hard drive, the database cannot be compacted. You must have roughly twice as much space available as the size of the database you are trying to compact. Delete any files you do not need and attempt to compact the database again.

Compacting the database fails if you do not have Modify Design or Administer permissions for all the tables in the database. If this database is not your own and was created by someone else, you must contact the original creator and get permissions on all the tables. If this database is your own, you must update permissions on all the tables. Search for help in Access under the topic "Compacting Database" for more information.

Note: If you attempt to compact a database from Access version 1.*x* and an object in this database includes a backquote character (') in its name, the database will not compact. Use Access 1.*x* to rename the object or update the database to Access 2000.

Repairing a Database

A database can become corrupted when a user turns off the PC without first exiting from Access, or when a power surge or other related problem prevents the user from exiting Access properly. Access usually detects a corrupted database when you try to open or compact a database and gives you the option to repair the database at that time. You cannot open or compact a database that is corrupted; you must first repair it.

NEW TERM A database is *corrupted* when the database is improperly closed or exited, leaving certain Access files open. Access cannot open databases that are corrupted, and will give an error message when you try to open one.

To repair the database that is currently open, select Tools, Database Utilities, Compact and Repair Database from the menu, as shown in Figure 23.3.

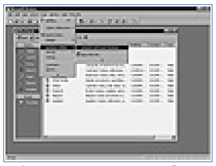

Figure 23.3 The menu option to repair a database that is currently open.

New Term When Access *repairs* a database, it fixes and closes the files that were left open when the database was improperly closed. Most of the time the repair will be completely effective.

To repair a database that is not currently open in Access, first close any open databases. Select Tools, Database Utilities, Compact and Repair Database from the menu as shown in Figure 23.3. Enter the name and location of the database you want to repair in the Database to Compact From dialog box. (see Figure 23.4). Click Compact to continue. Access repairs and compacts the database.

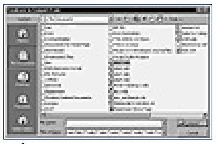

Figure 23.4 You choose the database you want to repair in the Repair Database dialog box.

Note: If your database is behaving erratically, you might need to repair it. As with compacting, it is a good idea to repair important databases that are frequently used. Your database might need to be repaired if nothing happens when buttons are selected, information is lost, or the system experiences sudden crashes.

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Backing Up a Database

Backing up databases was covered in Chapter 2, "A Quick Tour of Access 2000," but I will cover it again quickly and discuss how to restore a database from the backup copy.

All important databases must be backed up frequently on a regular schedule. A good rule of thumb is to back up those databases that you don't want to re-create from scratch. For most of us, that is every database.

Make sure the database is closed. If you are on a network environment, backing up a database is as easy as copying the database file to a drive on the network. If you are not on a network, backing up a database is still very simple. Choose a location or backup medium in which to place a copy of your database. You can use Windows Explorer, the MS-DOS copy command, or My Computer to copy the `.MDB` database file to the location you choose. Make sure there is enough room in this new location for the database to be written. Choose a location on a different disk or other media that will not be affected if the media containing the database file is accidentally erased or permanently corrupted. If you have the option, save a copy of the database to your network at work, or save a copy on floppy disk. You want to have a copy of the database in at least two separate locations and hardware mediums to ensure complete protection.

Restoring a Backed Up Database

If your original database has been corrupted or destroyed, you can restore your backed up copy of the database. Simply copy the backed up database from its location to your database folder. You also can choose to run the database from the backup copy location.

Note: If you copy the backup database to the same location as the original database and they both have the same name, the backup database overwrites the original database. If you want to save the original copy of the database, rename one of the databases before you copy the backup file.

Encrypting and Decrypting a Database

Sometimes you want to shield the contents of a database from unauthorized users. Encrypting a database might sound complicated and powerful, but it is actually very simple and not extremely effective. Encrypting a database makes the database information unreadable to word processors or utility programs. Encrypting a database also compacts a database first. The database is still readable by anyone with Access and a copy of the database because Access uses its own algorithm to encrypt the data. To restrict access to the database, you must define user-level security. Securing a database is covered later in this hour in the “Securing a Database” section. Decrypting a database reverses the encryption of the database. You don’t need a password to decrypt the database.

To encrypt or decrypt a database, first make sure the database is closed. You cannot encrypt or decrypt an opened database. After the database is closed, select Tools, Security, Encrypt/Decrypt Database from the main menu. Choose the database you want to encrypt or decrypt and click the OK button. Figure 23.5 shows the Encrypt/Decrypt Database dialog box. Choose the location where you want to write this encrypted or decrypted database and its name, and click the OK button.

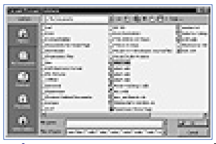

Figure 23.5 Use the Encrypt/Decrypt Database dialog box to choose the database you want to encrypt or decrypt.

Note: You can use the same name as the original database, but make sure to have a backup copy of your database. If you choose the same name and location as the original database, Access overwrites the original database with the encrypted or decrypted version. If there is an error when encrypting or decrypting the database, Access preserves the original database file.

The errors or problems that can occur when encrypting or decrypting a database are the same as when compacting a database. Refer to the section “Compacting a Database,” earlier in this hour, for more details.

Converting a Database

If you have used a previous version of Microsoft Access, you probably have databases that were created in a version other than Access 2000. Access 2000 databases use a file format different from any previous version of Access. You can open a database from any previous version with Access 2000, but the database is opened in read-only mode, and you cannot make changes to the database. You must convert the database to Access 2000 if you want to make any changes. When you open a database that was created in an earlier version of Access, you are prompted to choose if you want to convert the database or open it in read-only format (see Figure 23.6).

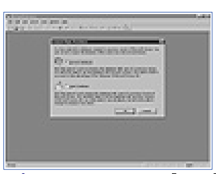

Figure 23.6 The dialog box that appears when you open a database that was created in an earlier version of Access.

To convert a database from a previous version of Access to Access 2000, select Tools, Database Utilities, Convert Database from the menu. Choose the database you want to convert in the Database to Convert From dialog box. Choose the name and location for the converted database in the Convert Database Into dialog box, as shown in Figure 23.7. You must choose a new filename or location for the converted database in the Convert Database Into dialog box. You have two databases when you are done: one in the older version of Access and one in Access 2000. Make sure the converted database was correctly converted and delete or rename the older version of your database. This ensures there is no confusion between the two databases.

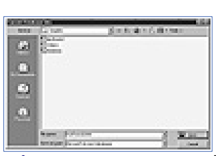

Figure 23.7 Use the Convert Database Into dialog box to specify the name and location of the converted database.

Note: After you convert the database to Access 2000, it cannot be converted back into a version earlier than Access 97, and it cannot be used by versions of Access older than Access 97. Keep a copy of the older version only if someone who has not upgraded to Access 2000 might need to use it. If you are in a network environment and more than one user uses the database, make sure all users have upgraded to Access 2000 before you convert the database. Keeping an older version of a database active is dangerous, considering that Access is not easily backward-compatible. It would be a good idea to make the older version Read-Only, and to create a warning to those users informing them that they are using an older version.

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Securing a Database

Methods on how to secure a database were covered in Chapter 4, “Understanding Someone Else’s Database.” This section outlines a brief summary of those methods.

Encrypting a database does nothing to prevent a user with Access 2000 on his computer from opening a copy of your database. To prevent this, Access 2000 provides two methods of adding security to your database. You can set a password for your database that prevents anyone who does not have the password from opening the database. You also can use user-level security to control which parts of the database the user can access or which parts the user can change.

The first and simplest type of security is password security. Databases with this type of security display a password screen when you try to load the database.

If you do not enter the correct password, you cannot open the database. If you enter the correct password, you are allowed to open the database. You also have the rights to view and edit all objects in the database.

Note: Do not use database passwords if the database will be replicated. Replicated databases will contain errors and cannot be synchronized when database passwords are enabled.

The second type of security is called user-level security, and it is more flexible and extensive than simply setting a password. This form of security is similar to a network system’s security. Users must enter a user ID and password when they open these databases. Each user is defined as a member of a group in the Workgroup Information file. Each group is given permissions that regulate what they are allowed to do with each object in the database.

There are some good reasons to use user-level security in databases that are distributed to a number of users. One reason is to protect the intellectual property of your database design and code. Users outside your company should not be able to determine how you designed your database and wrote your code. Another reason to use user-level security is to prevent users from accidentally changing the design or code of your database. Simple errors that users make can prevent your database from working properly or cause unexplained errors. Still another very good reason to use user-level security is to protect sensitive data you might have stored in your database. Unauthorized users should not have access to important data.

For more detailed information of user-level security, refer to the Help file documentation.

Summary

This hour discusses the topic of database administration. It covered the utilities that Access 2000 provides to make it easy to manage your database. How to compact, repair, back up, encrypt and decrypt, convert, and secure your database are also discussed in this hour. Although some of these utilities might seem trivial, they can be the most important steps in designing and managing your database. You should now know how to administer your databases.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned, and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A.

Q&A

Q **What versions of Access databases can be converted to Access 2000?**

A Any previous version of an Access database can be converted to an Access 2000 database.

Q **Can other databases be converted to an Access 2000 database?**

A Yes, some databases created using other applications can be imported or converted as Access 2000 databases. See Access 2000 Help under Converting Databases for more information.

Q **What is replication?**

A Replication is a new feature of Access 2000 that allows a database to be used at two different locations, but allows changes made at one location to be reflected at the other locations. This subject is beyond the scope of this book, but is covered in Help, and other Sams publications like Microsoft Access 2000 Unleashed.

Quiz

1. Why should I compact my databases?
2. How often should I compact my databases?
3. How does a database become corrupted?
4. Where should I back up my databases?

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Part VII
Advanced Topics

Hour 24
Access 2000 and the Web

Craig Eddy

By far the hottest news in computing during the second half of this decade has been the Internet and World Wide Web. Microsoft has promised that their products will make publishing information on the Internet in general and the Web in particular accessible to everyone. The Office 2000 suite, including Access 2000, goes a long way toward making this promise a reality.

Access 2000 has many features useful in publishing your data on either the Internet or an intranet. These features include the capability to export tables, queries, forms, and reports to HTML format and to create dynamic links to your Access database with Data Access Pages. Access 2000 also provides useful tools for actually publishing the files to your Web server. All these topics will be touched on in this hour. Hold on to your seat, you're about to blast into cyberspace!

NEW TERM An *intranet* is a TCP/IP network set up for access by people within a specific organization, not the entire world. It's implemented the same way as the Internet, and Web servers, FTP servers, and other Internet-related servers might be installed. However, unlike the Internet, which is accessible to everyone in the world, an intranet is accessible by only a select group of computers and users, usually within a single company or other organization.

NEW TERM *Hypertext Markup Language (HTML)* is the language that's interpreted by Web browsers and other viewers designed to display HTML files. HTML allows you to create a document that can be rendered (displayed) on any type of system from a text-based terminal to a high-powered graphics display. HTML is the language used to create most of the documents found on the World Wide Web.

Note: I'll once again be using the Northwind database to illustrate the steps in this hour. If you want to follow along, make sure you've installed the sample databases.

The topics covered in this chapter include

- Setting up the Web server application.
- Creating and accessing Web Folders.
- Exporting your data from Access 2000 into Web-accessible formats.
- Creating Data Access Pages.

Setting Up a Web Server on Your Computer

The Internet in general and the World Wide Web in particular have gained popularity because of their ability to provide a medium of information exchange. On the Web, this information exchange typically takes place when a Web browser application (acting as a client) requests a specific page from a Web server. The server then returns that page, assuming that the page exists and that the browser has the right to retrieve the page.

In the past, setting up a Web server required a great deal of knowledge about computers and networking. Now, assuming you already have an Internet or TCP/IP network connection, it's simple to install and operate a small-scale Web server.

Microsoft provides three levels of Web servers: the Personal Web Server (PWS), Peer Web Services, and the Internet Information Server (IIS). The Personal Web Server is designed for single connections or small networks and can run on Windows 95/98. The Peer Web Services are run on NT Workstation 4.0 and are designed for supporting small networks on an NT platform. Finally, the IIS is designed for large-scale networks and for the Internet. It is included in NT Server 4.0.

For your purposes, you'll stick with the Personal Web Server. The PWS and the Peer Web Services are part of the Windows NT 4.0 Option Pack (yes, Windows 95/98 users will need to obtain the NT Option Pack). You can download the NT Option Pack from the Microsoft Web site at http://www.microsoft.com/windows/downloads/winntw.asp.

The Personal Web Server will run on any machine capable of running Windows. You will need to ensure that you have enough free disk space to hold the Web content (pages) that will be available on your PWS, but beyond that the system requirements will be met by any computer currently running Windows 95 or Windows 98.

After you've installed the software (it's a pretty painless process) and restarted your PC, the Web server is probably up and running. By default, the PWS is set to run automatically when you turn on your computer. You can verify this by checking the taskbar for the PWS taskbar icon, shown in Figure 24.1. Double-clicking the icon will bring you to the server's properties dialog where you can check the server and make sure it's set up to your liking. Also, if you don't want the PWS running when you start the computer, the Services tab of the Properties dialog allows you to change Personal Web Server's startup behavior.

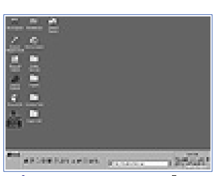

Figure 24.1 The Personal Web Server taskbar icon.

To test your Web server, start Internet Explorer and enter `http://localhost` in the address box. This is a special Web address that points the browser back to the same computer. If everything is operating properly, the default Web page installed with the PWS will display. You're now ready to begin publishing your Access data onto your Web site!

The PWS creates a content directory to hold your Web pages. The default folder for this is either c:\Webshare\Wwwroot for Windows 95/98 machines or c:\inetpub\wwwroot for Windows NT machines. You can make files available to the Web server by copying them to this directory. Note that Web browsers will have access to any files that you place in this directory. Put files here only when it's all right for everyone in your company, or organization, to see them. This extends to subdirectories as well. Anything under the wwwroot directory will be visible on your network.

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Introducing Web Folders

One of the coolest new features provided by Office 2000 is actually an extension to the Windows Explorer. Office 2000 adds a new entry to the Windows Explorer tree labeled Web Folders. You'll find this entry beneath the My Computer entry, as you can see in Figure 24.2.

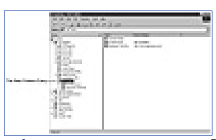

Figure 24.2 Windows Explorer with the Office 2000 Web Folders entry.

Web Folders act just like folders on your hard drive, except that they display files that are accessible through a Web server. The Web server (not your machine) must have either the Office Web Server Extensions or FrontPage extensions installed (see the Office 2000 CD for details on installing the Web Server Extensions on your Web server). After you've created a reference to a Web Folder, you can open files from and save files to that Web Folder just like you can with any folder on your local hard drive. In fact, the File Open and File Save dialogs throughout the Office Suite have a quick button that will take you straight to your Web Folders.

Adding a reference to a new Web Folder is quite easy. Click on the Web Folders entry in the Windows Explorer tree. Next double-click the Add a Web Folder entry. The Add a Web Folder dialog appears. You can either type the URL for the Web server you want to add (http://www.pipestream.com, for example) or click the Browse button. Clicking the Browse button will launch Internet Explorer, allowing you to navigate to the Web server you want to add. When you're on the proper page, click back to the Add a Web Folder dialog and the URL will be placed into the text box for you. When you've got the correct URL, click the Next button. The URL will be verified, making sure that the FrontPage or Office Server Extensions are installed and that you have the proper permissions to access the server. If all goes as planned, the new reference will be added to your Web Folders.

Note: In the File Open and File Save dialogs you can type the URL for a Web-based file without opening your Web Folders. When you're successful in doing so, Office will add automatically a new Web Folder shortcut for your future use.

Exporting Data to an HTML File

Now that you've seen how to work with Web Folders, it's time to investigate actually publishing data onto the Web. The remainder of this hour will be devoted to taking data from your Access 2000 databases and publishing it in a form suitable for the Web.

Access 2000 provides several ways to publish your data to the Web. You can either publish static data or dynamic data. Static pages never change; they always display the same data. Dynamic pages, however, generate queries against your Access databases and produce Web pages on-the-fly, using current data from the database. This section discusses creating static Web pages. The sections that follow explain how to publish dynamic Web pages.

Creating an HTML Template File

Access 2000 can create Web pages from datasheets, forms, and reports without any input from you. However, you can also specify an HTML template file to be used in creating these Web pages. This template file allows you to specify your own standards for the Web page to be created. You can add graphics such as company logos and backgrounds, as well as specify text colors, link colors, and background colors.

You can use any text editor or even a specialized HTML editor such as Microsoft's FrontPage 2000 to create the HTML template file. Store it in a common directory so that you'll have no trouble locating it when you perform an export. If you installed the sample databases when you installed Access 2000, a sample template for the Northwind database is installed in the same directory as the MDB file. It's named `NWINDTEM.HTM` and can be opened using Internet Explorer or Notepad.

In addition to standard HTML coding, template files can also contain tokens that are used as placeholders for various information. Place these tokens at the appropriate places in your HTML template file and Access will replace them when you perform an export with this template specified. Table 24.1 illustrates the various tokens and their replacements.

Table 24.1 HTML Template File Tokens

Token	Replacement
`<!--AccessTemplate_Title-->`	The object name is placed in the Web browser's title bar.
`<!--AccessTemplate_Body-->`	The exported data.
`<!--AccessTemplate_FirstPage-->`	A link to the first page of a multipage export.
`<!--AccessTemplate_PreviousPage-->`	A link to the previous page of a multipage export. For example, you may be viewing records 25–49 on page two of the export. Page One (the previous page) contains records 1–24.
`<!--AccessTemplate_NextPage-->`	A link to the next page of a multipage export.
`<!--AccessTemplate_LastPage-->`	A link to the last page of a multipage export.
`<!--AccessTemplate_PageNumber-->`	The current page number in a multipage export.

Performing the Export

To perform the export to an HTML format, follow these steps:

1. In the Database window, select the object to be exported.
2. Use the File menu and click Export, or right-click and select Export.
3. On the Export To dialog that appears, select HTML Documents in the Save as type drop-down list.
4. Select the location to save the HTML file to (a Web Folder is a good choice) and enter the name of the file. If you want to use an HTML template file, check the box labeled Save Formatted. If you check the AutoStart checkbox, the page will be opened for you after Access finishes creating it. Click the Save button.
5. If you elected to use an HTML template file in step 4, a dialog box will appear where you specify the location of the template file. You can either type the file's name or use the Browse button to locate the template using the familiar file dialog.

If the component you selected requires any user input before being displayed (such as a report with date parameters), you will be prompted to enter the required information. The HTML file is then created in the location you specified. You can use Internet Explorer to view its contents. Figure 24.3 shows the Northwind Customers table exported using the NWINDTEM.HTM template file.

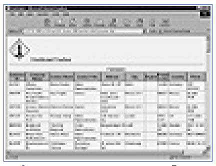

Figure 24.3 The Customers table exported to HTML.

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Creating Dynamic Web Pages

If you want to create pages that change each time they are requested (as opposed to the static pages created in the previous section), Access 2000 provides several options. Which one you choose depends on the capabilities of both your Web server and the clients who will be viewing these pages.

If you know that your clients will be using Internet Explorer 5.0 (typically this is only known for sure in an intranet situation), you can use Data Access Pages.

If, however, you have no control over the client's browser and your Web server is one of the Microsoft servers, you can export your objects to files that work on all browsers. These "live" pages are created using Microsoft's Active Server Pages (ASP).

Note: ASP files require a Web server in order to run. The Web server will process the information contained in these files and provide HTML data for the Web browser to display. You cannot open these pages as files on your machine. Static HTML pages and Data Access Pages, however, can be viewed as files on your machine.

Active Server Pages contain some scripting language, typically (but not necessarily) VBScript, which executes on the Web server. After the script executes, it returns a Web page to the requestor but doesn't return any of the script code that was executed. Active Server Pages can access any ActiveX-compatible component installed on the server machine, including database-aware components and ActiveX controls.

Creating an ODBC Data Source

Active Server Pages utilize ODBC to retrieve the data from your database. ODBC uses what's called a data source to define how to access the database. Before you can use the ASP pages you'll create, you need to have an ODBC data source defined.

To create a Microsoft Access ODBC data source, follow these steps:

1. Launch Control Panel and double-click the 32-bit ODBC icon.
2. Click the Add button. Select Microsoft Access Driver and click Finish.
3. The ODBC Microsoft Access 2000 Setup dialog appears. Here you assign the name for the data source, select the database to be used, set any advanced options, and perform some database utilities

(such as repairing or compacting the database once you've selected one). All that is required is a data source name and a database filename. When you've entered the required information, click the OK button to add the data source.

Creating ASP Pages

To create an ASP page, follow these steps:

1. On the Database window, select the item that you want to be displayed by the ASP page.
2. Open the File menu and click on Export. The Export To dialog appears.
3. In the Save as type drop-down list select `Microsoft Active Server Pages`.
4. Browse to the location where you want to save the page. Note that this location needs to be accessible via a Web server in order for the file to be processed properly. Unfortunately you cannot save this file to a Web Folder. You need to choose a folder on your machine or on your network. Click the Save button to continue.

The Microsoft Active Server Pages Output Options dialog, shown in Figure 24.4, will appear.

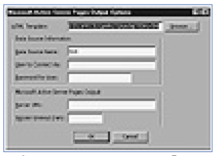

Figure 24.4 The Microsoft Active Server Pages Output Options dialog.

This dialog provides text boxes for specifying an HTML template file, an ODBC data source name, a user name and password, and information specific to ASP pages. As you can see, the template file has already been filled in for us because you chose this one when you exported earlier.

The actual data source specification does not need to exist yet; you can create it later. Unless you have secured your Access database using the techniques discussed in the preceding hour, or you're using a SQL Server database, you can leave the User to Connect As and Password for User boxes empty.

Click the OK button to save the page.

Figure 24.5 shows the results of the ASP page created for the Customers table. As you can see, it doesn't look any different from the page you exported (see Figure 24.3). The difference, though, is that if data in the database changes before the next time this page is loaded, it will automatically show the updated data.

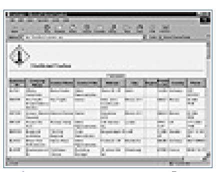

Figure 24.5 The results of an ASP page created for the Customers table.

Note: Until you create the ODBC data source, you won't be able to use the Active Server Page. You don't have to have the data source set up when you export to the Active Server Page because the export process simply places code referencing the data source within the ASP file. However, to actually run the ASP file, the data source must exist.

Data Access Pages

Now that you've seen how to create standard HTML pages using a variety of techniques, let's take a look at Microsoft's latest innovation in connecting databases to the Web: Data Access Pages. Data Access Pages are similar to Access forms, but are designed to work within the confines of the Internet Explorer browser.

When you create a Data Access Page using Access 2000, you're actually creating a Web page. This page is stored somewhere in your file system, as opposed to within the Access data store itself, but has a link that appears in the Pages section of the Access Database window. Access provides a designer which you can use to edit the Data Access Page in conjunction with your database's objects. However, if you prefer, you can use an external HTML editor such as FrontPage 2000 or Visual InterDev, but you won't have immediate access to the tables, queries, and relationships like you have with the Access designer.

There are four ways to create to a Data Access Page:

- By saving an existing table, query, form, or report as a Data Access Page (using the Save As menu item)
- Using the Data Access Page Wizard
- Using the AutoPage feature
- Using Design View to manually create a new Data Access Page

In the remainder of this hour, you'll build your first Data Access Page using the Wizard. The page will display information from the Employees table of the Northwind database. Next you'll modify that page, extending it to display information about orders taken by each employee, using the Design view.

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Creating a Data Access Page with the Wizard

Like most tasks in Access, there's a Wizard provided for creating new Data Access Pages. This wizard will guide you through the creation of a Data Access Page, even allowing you to do a hierarchical page that displays a master table (such as customers) and its related tables (such as orders). In this section you create a simple page based on the Employees table. In the section that follows you add to this page using the Data Access Page Design View.

To use the Data Access Page Wizard, follow these steps:

1. Open the database to which you want to add a Data Access Page. For your sample, open the Northwind database.

2. On the Database Window, click on the Pages section. Your screen should appear similar to Figure 24.6 (note that I've added a few Data Access Pages already, so your list will probably be different).

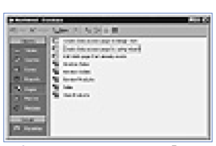


Figure 24.6 The Pages section of the Database window.

3. Double-click the Create data access page by using wizard entry in the list. The Wizard starts and displays its first dialog (see Figure 24.7).

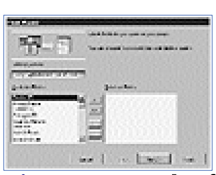


Figure 24.7 The first screen of the Page Wizard, where you select tables, queries, and fields for use in your new Data Access Page.

4. The drop-down list contains all the tables and queries defined in your database. Select the table or query with which you want to work. In your case, select the Employees table. After you select a new table or query, the Available Fields list will be repopulated with the fields from that table or query.

5. To add fields to the new page, double-click the field's name or select the field and click the > button. You can add all fields by clicking the >> button. You can remove a field by double-clicking its name in the Selected Fields list or by selecting it and clicking the < button. The << button removes all fields. For your example, add the `LastName`, `FirstName`, `Title`, and `Region` fields from the Employees table. Now click the Next button to continue.

6. On the next dialog, you can specify any grouping that you want to use. For your example, you want to group employees by region. To do so, double-click the `Region` field. Notice that the preview at the left of the dialog changes to illustrate the grouping. The Grouping Options button allows you to control how often the group will change with the data in the field. For most purposes, the default is fine, so you won't use this button. Click the Next button to continue.

7. Here you specify how you want the data on the page to be sorted. Select the `LastName` field in the first drop-down list (note that the `Region` field is not available in this drop-down list because it's being used as a grouping field). Click the Next button to continue.

8. Finally you come to the last dialog. Here you'll specify a title for the page, what action to take after the page is created (open or modify), whether or not to apply a theme to the page (this will change the look of the page based on some predefined templates), and whether or not to display help topics related to Data Access Pages. Make sure the Open the page radio button is selected and click the Finish button to create and open the new page.

After the Wizard cranks for awhile, the Web Page Preview window opens to display the newly created page. Figure 24.8 shows the new page.

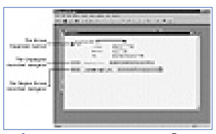


Figure 24.8 The Data Access Page created with the Page Wizard

You can use the Group Expansion button to show and hide the records belonging to a particular group. The recordset navigators enable you to move from record to record, to delete a record, to sort the recordset, and to filter the recordset. All these functions operate identically to the functions found in the Datasheet view for a table, query, form, or report.

The beauty of a Data Access Page is that it can be viewed in a standalone Web browser as well as within Access 2000. This means that you can take the Web page that's associated with the Data Access Page and install it (along with the database itself) on a Web server accessible on your intranet or the Internet. Doing so allows anyone to use the page you built to browse and modify the data presented by the page! Figure 24.9 shows the same page displayed in Internet Explorer.

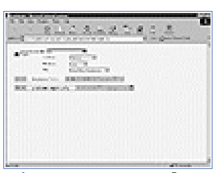
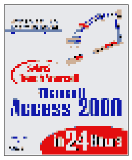


Figure 24.9 The Data Access Page displayed in Internet Explorer.

Because the Data Access Page has a hard-coded location for the database file, you'll probably have to modify it after you've moved the database to another machine. The simplest way to do this, after you've moved the database and associated Web page, is to open the Data Access Page in Design view and save it.

Note: To find out where the actual Web page file is stored, activate the Database window, select the Pages section, and hold the cursor over the page in question. The ToolTip will display the filename, including the folder containing the page.



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Modifying a Data Access Page in Design View

Now that you’ve created a simple yet powerful Data Access Page, let’s take a look at the Design View window for Data Access Pages. As you can see from Figure 24.10, the designer for Data Access Pages is very similar to the one for forms and reports. There’s a Toolbox, a Field List, and a Properties window. You work with these just like you work with their form and report designer counterparts.

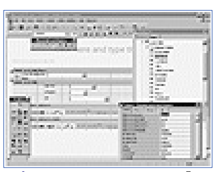

Figure 24.10 The Data Access Page displayed in Design view.

So let’s add an Orders grid to your Data Access Page. This grid will display all the orders related to the currently displayed employee. Adding it using the designer is a piece of cake, as you’ll see in the following steps:

1. Return to the Database window. Select the Pages section and select the Data Access Page you just created. Click the Design button. The Design View window appears.
2. First, you need to resize the detail area to make room for the Orders grid. Click in the blank area beneath the Header: Employees bar. The familiar resize handles will appear. Grab the bottom right handle with the mouse and drag it down and to the right. This will make the detail area taller and wider, leaving room beneath the `Title` field for your grid.
3. If the Field List window is not on the screen, click the Field List toolbar button (or use the View menu and click Field List). On the Field List window, expand Tables, and then Employees, and the Related Tables. Your Field List should look like Figure 24.11.

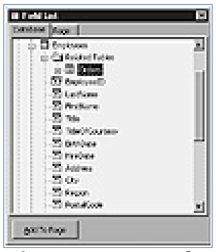

Figure 24.11 The Field List ready to add your Orders grid.

4. Click on the `Orders` entry under Related Tables. Drag this into the empty area you just created, dropping it at the right side of the empty space. When you're in the right area, a blue border will appear around the Header: Employees detail area (see Figure 24.12).

Figure 24.12 Adding the Orders table to the Data Access Page.

5. After the grid appears, resize it (click on the grid and use the resize handles) to fit within the empty space of the Header: Employees detail area.

That's all there is to it! Now switch to the Page View. Your page should appear similar to Figure 24.13. Whenever you switch to a different employee, the Orders grid will change to match the newly selected employee.

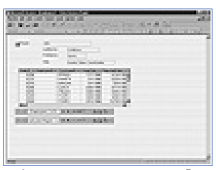

Figure 24.13 The modified Data Access Page in action.

Summary

This final hour has shown you another extremely useful way to put your Access 2000 databases to work. You've learned the basics of using Access 2000 to generate HTML files, either with static or dynamic data. You've also learned about the new and exciting Data Access Pages that enable you to create live-data forms and reports for viewing in a Web browser. Hopefully Access 2000 in particular, and the whole Office 2000 suite in general, will live up to its promise of providing everyone with the capability to publish information on the Web. This hour has given you the knowledge required to take advantage of this promise.

Workshop

The Workshop is designed to help you anticipate possible questions, review what you've learned and begin thinking ahead to putting your knowledge into practice. The answers to the Quiz are in Appendix A, "Answers to the Quiz."

Q&A

Q **My Internet service provider has told me that the Web server runs on a UNIX machine. Does this mean I cannot use the tools in this hour to publish Access data to the Web?**

A Yes and No. You won't be able to produce IDC or Active Server Pages files (unless a UNIX-based Web server capable of handling IDC and ASP files has been produced since this writing) for use on the Web server. However, you will still be able to create static HTML and use the Web Publishing Wizard even on a UNIX server.

Q **If I create an IDC or an ASP file attached to my database, is it possible for someone to gain unwanted access to the data?**

A No. Because the IDC and ASP files will use ODBC to open and query your database, they do not need to be accessible to the Web server itself. This means you can (and should) store the database in a directory that is not referenced by your Web server's configuration and is therefore not made accessible via the Web server.

Q In Figure 24.8, the Group Expansion button overlaps the Region label. Is it possible to move this button?

A Yes. This button is simply an HTML element which can be moved to anywhere else on the page.

Quiz

1. What is the primary difference between pages created for static HTML and pages created for IDC, ASP, or using Data Access Pages?

2. Which of the Web servers mentioned in this hour is designed for use on the Internet, where hundreds or even thousands of users can request pages at a single time?

3. How can you standardize the Web pages created using the techniques of this hour?

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Part VIII
Appendix

Appendix A
Quiz Answers

Hour 1

1. What, exactly, is Access 2000?

A relational database development tool.

2. What is the primary purpose for using an index?

Indexes speed up the execution of searches by creating an ordered list of the data contained in the index's fields.

3. What is the primary purpose of a query or view?

Queries and views are used to search, summarize, and analyze the data stored in a database.

4. What is the maximum size of the default data store for an Access 2000 database?

2GB.

Hour 2

1. Why are relationships between objects important to the design of your database?

Tables should be related to each other so information in one table can be accessed by other tables.

2. What are the seven main database objects used in Access 2000?

The seven main database objects are tables, queries, forms, reports, data access pages, macros, and modules.

3. How do you save your database in Access 2000?

You can save your database by simply exiting Access 2000. Access will save your data changes automatically, and ask you to confirm any changes made to the design of database objects which have open windows when you exit.

Hour 3

1. Where can you get help on the Internet?

Microsoft has an entire Web site devoted to the Office Suite. You will need to have an Internet browser program (such as Internet Explorer 5.0, which ships with Office 2000), and access to the Web. The Web address for Office support is http://www.microsoft.com/office, or use the Help, Microsoft on the Web menu from Access 2000.

2. How do you access Help?

The easiest way is to press F1 which will activate either the Office Assistant or the Access Help file. In either case, the topics presented will be relevant to what you're currently working on in Access and you'll have the opportunity to type a search phrase to get additional questions answered.

3. Can you browse for Help?

Yes. Press F1. If the Office Assistant is active you'll be able to enter a search phrase. If not, the Access Help file will load where you can browse the contents, use the index, of enter a search phrase.

Hour 4

1. How do you skip the startup screen when a database loads?

Press Shift while the database is loading.

2. How can you look at the relationships in a database?

Click the Relationship button on the toolbar.

3. Can you save the results of a database documentation?

Yes. Select File, Save As Table.

Hour 5

1. Which is more useful when you want to print a specific set of records in a datasheet: Find or Filter?

Filter. Find searches the entire set of records in the datasheet and locates only one record at a time. Filter removes all records from the datasheet except the ones that meet the criteria. You can then print these records using the standard datasheet printing.

2. Can you sort the datasheet based on more than one column?

Yes, as long as the columns are adjacent to one another in the datasheet. You can move columns by clicking once in the column header and then using click and drag to move the column to the desired location.

3. What differences are there between subdatasheets and standard datasheets?

None. All the functions which you can perform in Datasheet views can be performed upon a subdatasheet.

Hour 6

1. How can you determine which fields make up the primary key for a table?

Open the table in Design View. The fields that define the primary key are denoted with a key icon in the leftmost column of the grid at the top of the Design View window.

2. Which field property enables you to control what data can be entered into a field?

The `ValidationRule` property.

3. Can a field name contain spaces?

Yes, but doing so might require special handling when the field is being referred to in an Access expression such as a query definition or a code module.

4. Are you stuck with the subdatasheet that Access uses as a default for a table?

No, using the `Subdatasheet Name` table property you can specify that any related table should be used as the subdatasheet.

Hour 7

1. Which field property can be used to specify how data is entered into a field in an updatable query?

The `InputMask` property. The `Format` property is used to specify how the data should look when the field is displayed in a datasheet or on a form.

2. How can you, in one step, cause all fields involved in a query to be shown in the query's datasheet?

Set the query's `Output All Fields` property to `Yes`.

3. While in Datasheet view, when is the Insert Hyperlink toolbar button active?

Whenever the cursor is positioned in a field whose data type is set to `Hyperlink`.

Hour 8

1. What are the six types of forms in Access?

Single-column, Datasheets, Tabular, Subforms, Pivot table, and graphs.

2. Why should you use forms instead of tables for data-entry use?

Forms provide a much easier and more flexible interface to edit and add data. Forms also can drastically cut down on redundant data and data-entry errors.

3. Where is the underlying data in forms stored?

A query or table stores and supplies the data to a form.

Hour 9

1. What are reports?

They are the best way to present a customized view of information from tables and queries.

2. Why should I use reports?

They are the best way to distribute printed information.

3. What are the four basic types of reports?

Tabular, Single-Column, Mail-Merge, and Mailing Label.

4. What is the difference between forms and reports?

Reports are used to view data on-screen and on paper; forms are usually used to make data entry easier and more reliable.

Hour 10

1. What types of controls are available for editing field properties?

A standard edit box, a dropdown list box, and an edit box with a Builder or Wizard button available.

2. How can you view and modify the indexes defined for a table?

Open the table in Design view and choose View, Indexes to display the Indexes windows.

3. Can you change a field's data type if it already contains data?

Yes. Access attempts to convert existing data to the new data type. If any of the existing data cannot be converted, Access gives you the option of deleting that data or reverting the data type back to the original value.

4. What tool can you use to verify validation rules on demand?

The Edit, Test Validation Rules menu item will check the validation rules, the `Required` property, and the `Allow Zero Length` property.

Hour 11

1. Which query field property specifies how data is input into the datasheet view for a specific field?

The `InputMask` property. The `Format` property specifies how data appears when it is displayed in the datasheet.

2. In the Grid Design view, what do the lines that sometimes appear between tables in the table pane represent? Why are there sometimes arrows and the ends of the lines and sometimes not?

These lines represent a relationship between the two tables. Each join has a join type property which specifies which how related records will be included in the output. The arrow heads (or lack thereof) indicate which join type is specified. For more information on table relationships, see the section "Querying Multiple Tables" in this hour or refer to Hour 17, "Creating Tables."

3. What are the two ways to limit the results returned when the query is executed?

Use the Criteria rows for the fields involved in the query or use the query's `Filter` property.

Hour 12

1. What is a control?

Any object on a form, such as a text box or label.

2. What do controls do?

Provide an easy way to enter and display values, or provide some other type of feedback to the user.

3. What is an option group?

Option groups contain two or more toggle buttons, option buttons, or check boxes, and provide a way to select one option from many choices.

Hour 13

1. What are the two main views of reports?

Design view and Print Preview view

2. What database objects do reports display information for?

Queries and tables

3. What sections make up a report?

Report header, page header, group header, detail, group footer, page footer, and report footer.

Hour 14

1. What is a data model?

A data model describes what tables are to be included in the database, what the properties of those tables are, and what relationships exist between the tables.

2. For which elements can you specify a style when creating a database using the Database Wizard?

For both display elements (such as forms) and reports. You can specify different styles for each of these.

3. When creating a table using the Table Wizard, are you stuck with the field names in the wizard's template?

No, you can modify the field names by selecting the field in the wizard's initial dialog box and clicking the Rename button.

Hour 15

1. Why should you use wizards?

Wizards save time and effort, and can also help you to avoid errors. You can also look at the end result and learn more about creating and modifying objects.

2. Why should you use the Table Analyzer Wizard?

The Table Analyzer Wizard helps you create a more efficient database by splitting up tables that store duplicate data into separate, related tables.

3. What query wizards are available?

There are four query wizards: Simple Query Wizard, Crosstab Query Wizard, Find Duplicates Query Wizard, and Find Unmatched Query Wizard.

4. How many database wizards are there that create complete, new databases?

There are up to 22 databases you can create using the New Database Wizard.

Hour 16

1. Name the three types of keys.

Primary, composite, and foreign

2. What is the main difference between a primary and a foreign key?

A primary key serves as the unique identifier in a table. A foreign key is used in another, related table to establish the relationship between a record in this other table and a record in the table in which the matching field is the primary key.

3. Name the three types of joins.

One-to-one, one-to-many, and many-to-many.

4. Briefly define normalization.

The modification of a database's structure so that it meets the requirements of a fully relational database. The process of eliminating redundant data, ensuring that elements are atomic, and eliminating repeating groups of fields.

5. Having multiple fields in a single table to represent different types of phone numbers is an example of what?

A repeating group. The multiple fields could be broken off into a separate table which contains the following fields:

- A field for the foreign key reference back to the original table.
- A field to describe the type of phone number being represented.
- A field for the actual phone number.

Hour 17

1. Which method would you use to create a table if the original data source was in an outside database and you wanted to update the original data when you changed the data in Access?

Use the Link Table method.

2. What is the data type that you use when you want Access to automatically create unique values for each new record?

AutoNumber

3. How would you restrict data in a field to only dates?

Create an input mask that only accepts date-formatted input.

4. What's the main purpose for creating table indexes?

To speed up queries by providing Access with a "road map" of the data contained in the table.

Hour 18

1. You have a query that returns a number of fields, including `Title` and `Hire Date`. How would you sort a query first by `Title` from lowest to highest, and then by `Hire Date` from highest to lowest?

In the Query Design view's QBE Grid, click on the Sort row for `Title` and select `Ascending`. Next click on `Hire Date` and select `Descending`. Also, make sure that the order is correct: The column for the `Title` field must be to the left of the column for the `Hire Date` field.

2. Which wildcard symbol would you use to match a single character in a field?

The question mark.

3. What does the >= operator mean?

Greater that or equal to.

4. How do I get the total of all the values in a field?

Create a grouped query and select `Sum` in the Total row for the field that you want to total.

Hour 19

1. What are the six types of forms?

Single column, tabular, datasheet, main/subform, pivot table, and graph.

2. What are the three main types of controls?

Bound, unbound, and calculated.

3. What should you do before creating a form?

Think about the overall design of the form. On paper, draw a blueprint of how you want the form to appear on the screen.

4. How do you add the current date or page number to a form?

You can use the `=Date()` and `=Page` functions.

Hour 20

1. What are the fundamental building blocks of reports?

Controls and properties

2. What kind of special effects can be added to a report?

Lines, boxes, graphs, and images. Tables and queries supply the data used in the report.

3. What are the nine steps in designing a report?

The nine steps are:

- **a.** Design the appearance and function of your report.
- **b.** Determine what data is needed.
- **c.** Create the table and/or query to which the report will be bound.
- **d.** Create a new report and bind it to the table or query.
- **e.** Place the relevant fields on the report by using text controls.
- **f.** Add other labels and text controls for other fields as necessary.
- **g.** Modify the appearance, location, and size of the various controls.
- **h.** Define sorting and grouping options.

i. Use graphics and other special effects to enhance your report.

Hour 21

1. What is a macro?

A macro is an object that executes tasks or a series of tasks when run.

2. Why should I use a macro?

A macro helps with any repetitive task to save time and effort, and performs difficult actions with ease.

3. What are events?

Events are the result of some user action, such as clicking a button, pressing a key, or moving from one field to another.

4. Why use events to trigger macros?

Events make great starting places for macros to be run, such as clicking a button to start a macro, or moving into a field to run another macro.

Hour 22

1. What is the main difference between the Merge It and the Publish It Office Links?

The Merge It Office Link allows you to combine data from the database with a Word document. This creates a link between the Word document and your database. The Publish It Office Link merely exports the data into a new Word document that is static.

2. When using the Merge It Office Link, must the document to be merged with already exist?

No. Access gives you the option to create a new document or open an existing document.

3. What size labels can be created using the Label Wizard?

Any size. If you don't have a standard Avery brand label, you can create your own custom label definitions by clicking the Customize button on the initial dialog of the Label Wizard.

Hour 23

1. Why should I compact my databases?

Compacting your database saves hard drive space and increases database speed.

2. How often should I compact my databases?

It depends on the size and frequency of use, but once or twice a month is a good place to start.

3. How does a database become corrupted?

When you close or exit Access improperly, such as turning off your PC without exiting Access.

4. Where should I back up my databases?

Preferably on a separate computer network or on a floppy or other disk.

Hour 24

1. What is the primary difference between pages created for static HTML and pages created for IDC, ASP, or using Data Access Pages?

The IDC and ASP pages are dynamic—they retrieve up-to-date data from the database each time they are requested.

2. Which of the Web servers mentioned in this hour is designed for use on the Internet, where hundreds or even thousands of users can request pages at a single time?

The Internet Information Server

3. How can you standardize the Web pages created using the techniques of this hour?

By using an HTML template file and placing within this file the standard elements and properties for your Web site.

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