

Storage & Retrieval

Databases Make Vast Data Manageable

question is posed. If you want to know how many employees whose names are entered in a database live in Denver, each record must be examined for the entry "Denver." Then, the number of qualifying records are

solutions or complex programs installed on company servers that required specialized personnel to manage them.

Fortunately, most software designers' computers should be used to improve upon manual processes. Database theory has been reshaped to place an emphasis on making information storage more compact and cross-referencing easier, resulting in the popular approach of relational databases.

Databases kept in card files or on lists have linear structures and are very different from the relational format. A **relational database** lets a user group and link common information across multiple files or tables. If you keep a list of contacts in a card file, each card might list the contact's name, business, and address. If you make several contacts at the same business, you could end up rewriting the same address on each card. With a relational database, the address is entered once for that business and each contact is entered once. Then, each contact can be linked to that business and address. The relational format compresses data for efficient storage.

■ Why Use A Database? A database such as Access is better than a manual system such as card files and file folders because the benefits of storing information on a computer apply: fast access, portable information, legible data, and fast manipulation of digital data. You probably couldn't get a quick tally of costs from invoices kept in a file cabinet as you could with invoices kept in a database.

A database is better for storing information than a spreadsheet because a database has more tools for controlling data integrity, is designed to handle intensive data entry, and can handle many types of data. You can't store pictures of your products in a spreadsheet, but you can in a database.

It is said that knowledge is power, and while the right information has been known to create fortunes and topple kingdoms, information worth its weight in gold can be lost if it's not well-organized. Collecting data is great; being able to extract intelligent information from that data is even better. One modern tool contributing to the smart use of information is database applications such as Microsoft Access 97, which can help you manage your data smoothly and efficiently.

■ Database Primer. A database, in the strictest sense, is simply a bunch of information related to a particular subject. Inventory tracking or addresses, for example, are common database contents. Databases, therefore, can reside in card files, file cabinets, and spreadsheets, but extensive databases are managed better in a database application such as Access. In this issue, we refer to a database as a computerized application such as Access.

People have always been interested in collecting information about their surroundings. As technology improved, information storage evolved from cave walls to computer disks. The amount of information people collect has exploded, but the chief requirement for data storage has remained constant: Data must be organized so it can be retrieved easily.

To retrieve information from a database, all information must be searched every time a

tallied. Over time, we have developed different ways to manage data—from lists written on paper to card indexes to database applications.

Keeping data in a database application is different from any other form of data storage because the application manages, organizes, and streamlines the data in addition to storing it. For instance, if you want to keep track of invoices, you can simply scan the data and store it in text documents. It would be difficult, however, to manipulate the information further.

You could not, for example, easily count how many invoices there were in June, calculate the average order amount per invoice, or find an invoice for Grace Adams submitted in March 1997. A database organizes information through logical relationships and cross-indexing so you can pull the answers you need readily.

Although we celebrate the virtues using databases to manage data, it is often the least-used application in a software suite. Often, this is because the advantages over the manual approach it replaced are not readily apparent. As PCs became more common, users migrated from typewriters to word processing applications, from ledgers to spreadsheets, and from drafting tables to graphics programs. The closest manual comparison between computers and manual means of organization is the card file. Some of the first manifestations of databases were computerized approaches to manual

TABLE 1

Employee #	Store #	Last Name	First Name	Address	Phone #
1894	11	Smith	Jane	114 Marington Way	555-1213
1895	4	Huggins	Elizabeth	233 Apple St. #7	555-7879
1896	67	Johnson	Samuel	47 B St. #5	555-2994
1897	67	Baxter	John	3254 Oliver Ave.	555-1213

TABLE 2

Employee #	Salary	Date Hired
1894	42,600	5/9/90
1895	24,800	6/22/86
1896	28,000	11/28/96
1897	57,000	3/19/97

Relational databases are able to access information from more than one table of data at once as long as those tables share a similar field. A relational database, for example, can use the employee number filled in

the two tables shown to answer the question, "How many employees Store 67 make more than \$50,000 a year?"

Databases make it easier to find records later, perform calculations, and analyze the data for more information. For example, you would probably be able to find patterns in a students' grades more readily in a database than from a stack of graded papers.

In general, a database is best when you need to store important list-type information, you need to refer to it often, and you want to cull data organized by criteria you determine.

■ The Benefits Of Data Management. Managing data means organizing it so you can more easily get answers to your questions and pick out patterns in the data. Here are some of the tasks Access can perform to help manage data.

Store information. Databases are, at the least, storage repositories for data. Databases also have features that make data entry easy, restrict data to valid ranges, automatically format data types such as currency, force users to pick choices from existing lists, and store data compactly.

Organize information. Databases add logical organization to the data by breaking it into small units, grouping related information together, and creating indexes to link and reference the data.

Search for specific data. Databases have functions for pulling specific information; this is the biggest difference between a database and any other application. This is called a **query**, and when data is categorized and

indexed, searching for specific records you request is performed quickly and easily.

Reporting information. Because you can easily sort and search for information, you can conveniently show just the information you want on-screen or on printed output.

Performing calculations. A database can perform many basic calculations such as sums, averages, or tallies on groups of the data you specify. This is helpful when you want to figure out bottom lines, compile statistics, and analyze patterns in your information.

Not all information, of course, should be kept in a database. Pages of text belong in text documents and complex financial computations are better served in spreadsheets. Still, even data in other applications and formats can easily be linked to a database. For example, you could quickly reference an employee manual while editing information in an employee database by attaching a link in the database to pull up the intranet page where that information resides.

If you have lots of related data that need to be retained, a database might be a good place for it. If you can benefit from retrieving subsets of information, storing it in a database might be worthwhile. If you must switch among many files to retrieve data, such as data spread across several spreadsheets, storing it in a database is a good idea.

A database doesn't have to be restricted to business use. As you will see in the articles in this section, Access is fairly easy to use right

away, has many database templates, and be used to organize any collection of information you have from stamp collections to household inventory to exercise logs.

Overall, data that can be managed well in a database include the following:

- lists and collections, such as inventory logs
- data that could benefit from being linked, such as contacts and addresses
- data that doesn't require too many computations, such as employee records
- data that would otherwise be stored redundantly, such as several grades matched to one student

■ Databases vs. Spreadsheets

Spreadsheets often are pressed into service as databases. Microsoft estimates 70% of Microsoft Excel users use this spreadsheet program as a database, and it's not hard to see why. Spreadsheets are easy to use and are familiar to most users. Its simple format of rows and columns makes it convenient for storing lists. This may be adequate, but only if the lists are simple. Spreadsheets, however, lack much of the functionality built into databases such as data entry checking, searching for specific information, and the ability for multiple users to access data at the same time.

Note the difference in searching for specific data in a spreadsheet versus a database. If you say you have a class of students, and you want a list of those with at least a B average. If the records were kept in Excel, you would print

sort; in Access, you would run a query. A sort will show a list of all students from the highest grades to the lowest. A query will show you a list of only students with the desired grade. Furthermore, a query could give a much more detailed response, such as a list of just seniors with at least a B average who have taken calculus. Sorting cannot perform this function.

The prospect of building a database might appear intimidating, but a database is simple to build and can be kind of fun to maintain. Access is especially easy to use because it provides wizards and templates that can make creating a simple database a 60-second chore. Access also provides features that let you develop your database as specialized or as general as you need it. As you add more features to your database, sources like this magazine or Access' Help files can show you how to make refinements.

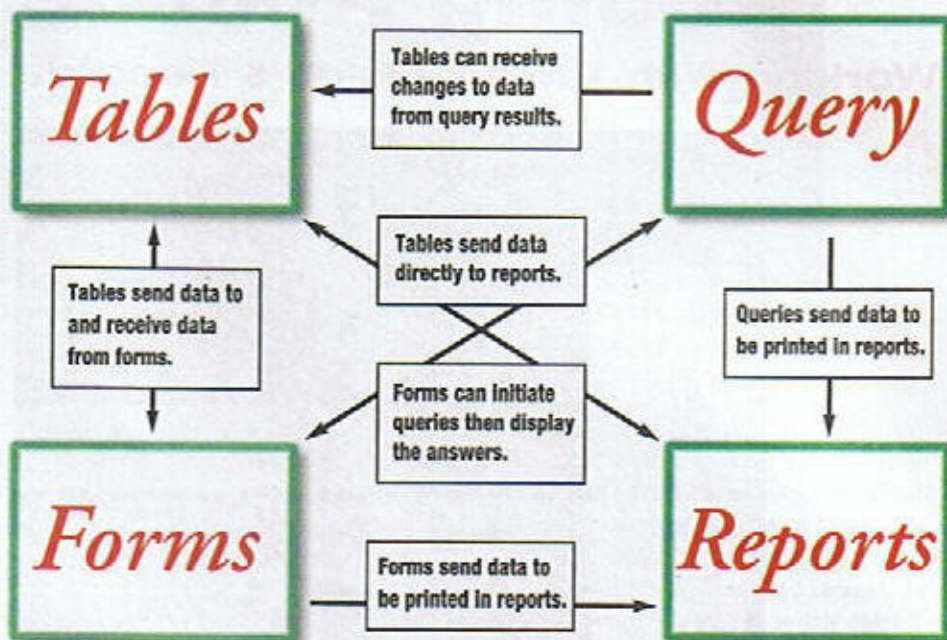
If you want to use a database to manage information you currently keep in another source, such as an Excel spreadsheet or in a text document, Access can handle it. Import functions can move information from several types of sources into an Access database. You might need to manipulate the data somewhat once you get into Access, but the import process is fairly simple and fast.

The Sum Of Its Parts. The first job of a database is data storage; a user enters a record and saves it in the database. A record is information about one entity, such as one employee in an employee database. A database enhances data storage because it saves information in the smallest division possible, called a **field**. An employee database, for example, could have fields for employee last name, employee first name, employee identification (ID) number, salary, and performance rating. The database adds further functionality by allowing fields to be cross-referenced.

In the employee database, the field for an employee ID number could be linked to the field for performance rating. This way, a record for each employee's semi-annual review could be kept and multiple reviews can be linked to one name. This type of organizing makes it easier to search for specific data later and prevents storing redundant data.

Records and fields are a database's building blocks and roughly correspond to a spreadsheet's rows (for records) and columns (for fields). When you open Access and work with a table, you will notice the table looks very much like a spreadsheet. Tables are displayed in this format for quick viewing, but tables have many

Parts Of A Database



The basic components of an Access 97 database application are forms, queries, tables, and reports. This illustration shows the relationships among these database elements.

features for manipulating data, as you will find out in the following articles in this section.

An Access database is comprised of several components. When you build the components you need and link them together, you will have built a database application.

The foundation of every Access database is the **table**. Tables are where fields are defined, indexes are created, and limits are placed on data to ensure its integrity. Data can, and often should, be separated into more than one table to organize data into logical groups. For instance, each book in a library database would have one record containing all its information, but the data could be separated into tables by book information, author information, and lending history.

After tables, the next component usually built is the **form**. Forms define the on-screen layout that dictates how users will view and edit records, query data, and print reports.

The **query** component is how answers to questions will be retrieved. Queries are actions you construct to pull specific information from a whole body of collected data. If you have an inventory database, for example, you might want a monthly tally of which products must be reordered. You would then design a query that sets the minimum limits, counts the amount of each product, and returns a list of which

products need to be reordered. With Access, queries can be built with a good deal of sophistication including changing or deleting data from tables, pulling data from multiple tables, and allowing users to enter several search criteria.

A **report** produces printed output of the data in your database. Like forms, reports can be designed to look any way the user wants and can work in conjunction with queries.

The last two components of an Access database are macros and modules. These advanced functions are used to automate tasks in the database for an even more seamless application.

The components work together when the database application is opened. The user sees a form used to enter data, and the data is stored in tables. Criteria can be entered in a form to search for data, and the form runs a query. The information is returned on-screen in a form or printed in a report if the data needs to be on paper.

Other articles in this section take a deeper look at how Access works to help you build good databases. If you find you need more or better data management than you currently have, don't be daunted. Access is a great tool, robust enough to build company-wide applications and friendly enough for the novice to jump in and build a database right away. ■

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