

Database 101

A little bit about databases.

Version	Date	Author	Change Description
2.0	2/22/08	Microdesign	Add references, delete obsolete links

There seems to be a lot of mystery surrounding databases. Here is a brief discussion of the components of a database, things to think about when designing a database, and a couple of references.

Database Components

Fundamentally, there are only a couple of technical terms; *field*, *record*, *table* and *database* which describe the concepts.

Assume that we want to store a list of names and addresses on the computer.

1.1.1 Field

A field is a discrete piece of information. Fields have *types* which may describe or constrain the information that can be held in a field. Types may be things like a *date*, or *time*, a string of *text*, or a *number*. Almost all fields are *text*. In our example, each field holds part of the name and address, so the field names might be:

First
Last
Address
City
State
Zip

1.1.2 Record

A record holds all of the various discrete pieces of data for a single entity. In our example, a record holds the data about a single person; their name and address.

In almost all databases, each record in the table will have a special field called a *key field* which will uniquely identify the record. This identifies a record even if there is identical data in two or more records; persons with the same name, for example.

1.1.3 Table

A table holds a group of records. The main tables of a database will often correspond to things in the real world...a *group* of students, a *list* of high school locations, a *list* of wines.

1.1.4 Database

A database is a group of tables. In our example, we might have a table for the names and addresses, and a separate *look-up* table to hold a series of zip codes and towns. This would allow the program to look up the appropriate zip code for a town and put it in the *zip* field of the name and address table.

A common use of the word database is to refer to a *database program*, such as Microsoft Access, or FileMaker, or SQLServer or Oracle. Each of these programs still uses fields, records, tables, and databases.

Thinking in Databases

Once the four definitions are clear, you can start to think of almost any data problem as a series of fields, records and tables. Examples:

Patients

Office visits
Referrals
Treatments
Payments

Car

Mileage between fill-ups
Service Records
Destinations

and so on. Each database program comes with a dozen or so beginning databases for business and personal use.

1.2 Adding and Manipulating Data

Figuring out which tables you need and the data to store in them are the core functions of building a database. However, if you only needed to build a few tables, you could do it in Excel. And in fact, as a preliminary step for building a database, Excel, or other spreadsheet files work pretty well.

1.2.1 Forms

The best way to get data into a database (if you have to type it yourself) is through a data entry screen or *form*. The form can lead you through the process of adding a record to a table. Forms can *look-up* data from other tables or databases, and check or *validate* data as it is entered. The Google home page is probably one of the best examples of a simple data entry form, with a single field available for typing, and several links or buttons available to make choices.



A more traditional form, used for data entry, is this form. Note this form has several fields for typing in text, several checkboxes for entering yes/no data, and a radio button to choose between mutually exclusive options. All of these make the work of data entry a little easier.

1.2.2 Queries

Queries are used to get data *out* of a database. Indeed, often getting data out of a database is considerably more difficult than putting it in, and the ability to easily find out what is in a database is based on the database design and the database queries.

1.2.3 Reports

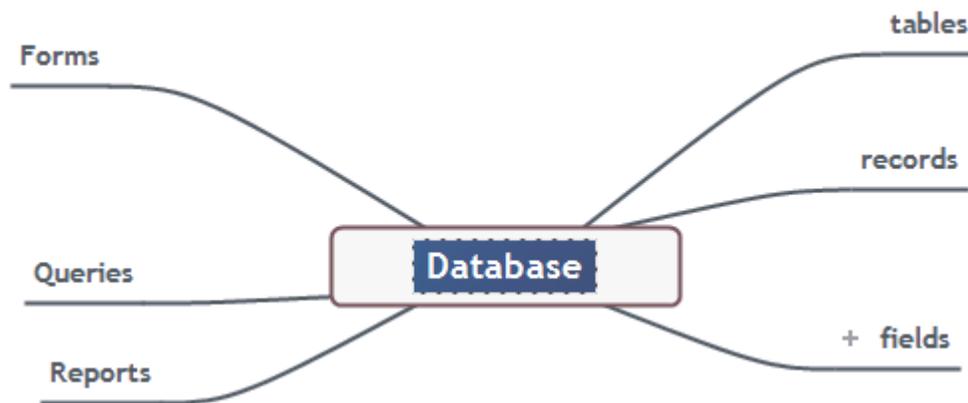
Reports format and display data from the database. Traditionally, reports have always been printed out. Most modern databases will allow a screen preview which may be all that is necessary. Reports are often emailed to others, sent to a word-processing document, or converted to html for display in a web page.

Reports and queries work together. For example, I might want a list of all of the people in a certain town. The query will find them. The report will format the query results and print out the names and addresses. Depending on the report, the results might be displayed as:

- Multiple names and addresses on a page, one name per line
- Names displayed in a 3 column format, like a "directory"
- Names displayed in a label format for printing labels
- Names sent via an eMail attachment to a colleague who will use them in a mail merge letter

1.3 Thinking about your own database

Building your own database is a multi-step process. The steps will repeat at various times.



The sequence will be something like the following:

1. Create titles of sample reports. What periodic information do you need to provide to run your own business? Examples: Quarterly number of hamburgers sold, Key Indicators, Hours of service, Collected material:weight in pounds by month
2. Create queries: These would be natural language statements, like: "Give the last names of all persons over 35 who live in any town in Columbia county"
3. Create sample tables. Consider which fields you want to have in each record. You may end up gathering existing data for this. Note that in the query above, you are asking for a range of ages, a last name, and a county, which imply already that you are going to need to store those three fields in a table somewhere. As a hint, use Excel to sketch out your records, where rows are records and columns are fields.

A report almost always implies a query. A query always implies one or more tables.

Resources:

[Database Design for Mere Mortals](#) by Michael Hernandez

This book, which is available used on Amazon for about one dollar, is a gold mine of information for an software and platform-agnostic discussion of database design.

[Grover Park George on Access](#)

If you use Access, part of the ubiquitous Microsoft Office, then this book is one of the better guides.

Website: www.techforprofits.com
