

# Designing a Database

## Introduction to designing a database

The first step in creating a database is to plan the content, structure, and design. While many database planning tools exist for free and for purchase, often times this is easier just to do on paper to save time and effort later. **Remember, a well-designed database promotes consistent data entry and retrieval, and reduces the existence of duplicate data among the database tables.** For this reason, it's important to take your time throughout each stage of the planning phase. To plan a database consider the following steps:

1. Determine the purpose (covered in this lecture)
2. Consider the information (covered in this lecture)
3. Consider how categories might be related (covered in this lecture)
4. Determine the tables and fields (covered in lectures 4 and 5)
5. Determine relationships (covered in lectures 6 and 7)
6. Access, review, and document (not covered)

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## Step 1: Determine the purpose

Determine the purpose for your database, or the problem you want to solve. For example:

- ❖ "to keep a list of my customers"
- ❖ "to manage my inventory"
- ❖ "to grade my students"
- ❖ "to work with data on my desktop computer, on my iPad, and in a web browser."

If other people will use the database, be sure to talk with them about the data they will need.

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## Step 1: Determine the purpose

### **The Vecta Corp. Help Desk Database Purpose**

*"to build a help desk application that allows employees to track and alleviate customer issues that they may have with Vecta Corp. software"*

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## Step 2: Consider the information

Consider the information you will store in your database. Typically, information falls into broad categories. Accurately identifying these categories is critical to designing an efficient database, because you'll store different types and amounts of data in each category. For example, a database intended to track sales has categories such as "customers," "products," and "invoices." A database that records student grades has categories such as "students," "classes," and "assignments."

In database terminology, these categories of information are referred to as **tables**. Tables are used to group data containing a common element or purpose. For example, you might use one table to store names and addresses, while you use another table to store transaction details, such as date of sale, item number, unit price, and so on.

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## Step 2: Consider the information

### **Vecta Corp. Help Desk Database Information**

- ❖ Employees who work for the company who might want to assist in customer support
- ❖ The role of each employee within the company
- ❖ A list of tickets or work orders for each Vecta Corp. customer
- ❖ A list of solutions that Vecta Corp. sells that customers might have problems with
- ❖ Status of a ticket. Is it unassigned? It is being worked on? Has the problem been resolved?

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## Step 3: Consider how categories might be related

Consider how your categories are related. This can be done by writing simple sentences that describe how the categories interact, such as "customers order products" and "invoices track customers' orders." Or you can draw each category and show its connection to another. Each pair suggests a relationship between the data in one category and the data in the other category. Typically, databases are organized in one of three ways:

- ❖ A single table in a single file. Use a single table if you need to track data in one category only, such as names and addresses.
- ❖ Multiple tables in a single file. Use multiple tables if your data is more complex, such as customers, products, and invoices.
- ❖ Multiple tables in multiple files. Use multiple files if you need to share the same data among several different database solutions. For example, you can store your tax rates or shipping information in a separate file if you plan to use that information in more than one solution.

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## Step 3: Consider how categories might be related

### Vecta Corp. Help Desk Database Relationships

- ❖ Each **employee** serves a specific **role** in the company
- ❖ **Tickets** are how the company tracks interactions between **employees** and **customers**
- ❖ Each **ticket** relates to a problem with a Vecta Corp. **solution**
- ❖ An **employee** can update the **status** of a **ticket** that she is working on

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## Step 4: Determine the tables and fields

Determine the tables and the data they will include, and, in turn, which fields you will need.

To make it easy to search and sort records, create separate fields for first and last name, titles (like Mr. or Dr.), and items in addresses like city, state or province, country, and postal code. This process is known as normalization and is covered with more detail later.

Separating your data into multiple fields at the time of data entry can make it easier to generate future reports. For example, using separate fields to capture transaction details such as the date, item number, quantity, and unit price of each transaction makes it easier to compile summary reports at the end of a week, month, or year.

*Note: Creating tables, fields, and adding data are huge topics in database design. I have several lectures devoted to the topic and we will also work through these topics together in Lab 1.*



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## Step 5: Create relationships

Create relationships to share data between tables in the same file or with tables in external files.

*Note: Creating relationships between tables is also a huge topic in database design and is usually referred to as relationship management. I have several lectures devoted to the topic and we will also work through relationships together in Lab 2.*

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## Step 6: Access, review, and document

- ❖ Determine whether you need to share your database with other users and how they will access it. And, if you're designing the database for other people to use, show them your paper plan and ask them to review it and suggest any changes.
- ❖ Consider who will use the database, how and why they will use the data, and how you will restrict access to the database. This is typically done by setting permissions and roles and in most cases is much easier to accomplish via the DBMS.
- ❖ Create a form that lists all the files and tables you need and the fields for each table. Most importantly, list the forms and reports you will generate from each table.

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## Step 7: Create and test

- ❖ Create your database.
- ❖ If you've designed the database for others to use, ask a few people to test it. Fix any problems before making it available for general use.

*Note: The main focus of this lecture is to create a database. We will do this together in Lab 1.*