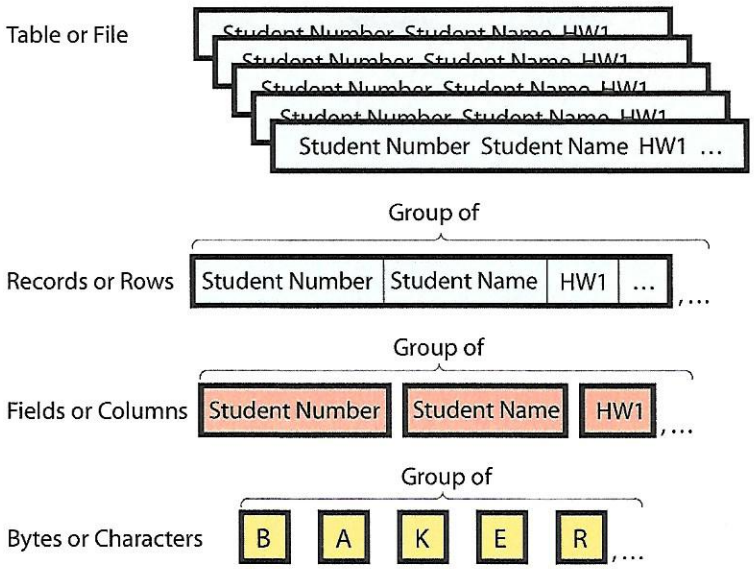

Figure 5-4
Hierarchy of Data Elements

called **fields**. Columns or fields, in turn, are grouped into **rows**, which are also called **records**. In Figure 5-3, the collection of data for all columns (*Student Number*, *Student Name*, *HW1*, *HW2*, and *MidTerm*) is called a *row* or a *record*. Finally, a group of similar rows or records is called a **table** or a **file**. From these definitions, you can see that there is a hierarchy of data elements, as shown in Figure 5-4.

It is tempting to continue this grouping process by saying that a database is a group of tables or files. This statement, although true, does not go far enough. As shown in Figure 5-5, a database is a collection of tables *plus* relationships among the rows in those tables, *plus* special data, called *metadata*, that describes the structure of the database. By the way, the cylindrical symbol labeled "database" in Figure 5-5 represents a computer disk drive. It is used like this because databases are normally stored on magnetic disks.

What Are Relationships Among Rows?

Consider the terms on the left-hand side of Figure 5-5. You know what tables are. To understand what is meant by *relationships among rows in tables*, examine Figure 5-6. It shows sample data from the three tables *Email*, *Student*, and *Office_Visit*. Notice the column named *Student Number* in the *Email* table. That column indicates the row in *Student* to which a row of *Email* is connected. In the first row of *Email*, the *Student Number* value is 1325. This indicates that this particular email was received from the student whose *Student Number* is 1325. If you examine the *Student* table, you will see that the row for Andrea Baker has this value. Thus, the first row of the *Email* table is related to Andrea Baker.

Now consider the last row of the *Office_Visit* table at the bottom of the figure. The value of *Student Number* in that row is 4867. This value indicates that the last row in *Office_Visit* belongs to Adam Verberra.

From these examples, you can see that values in one table relate rows of that table to rows in a second table. Several special terms are used to express these ideas. A **key** (also called a **Primary Key**) is a column or group of columns that identifies a unique

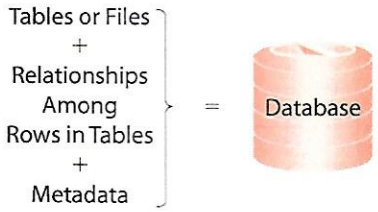

Figure 5-5
Components of a Database