

Introduction

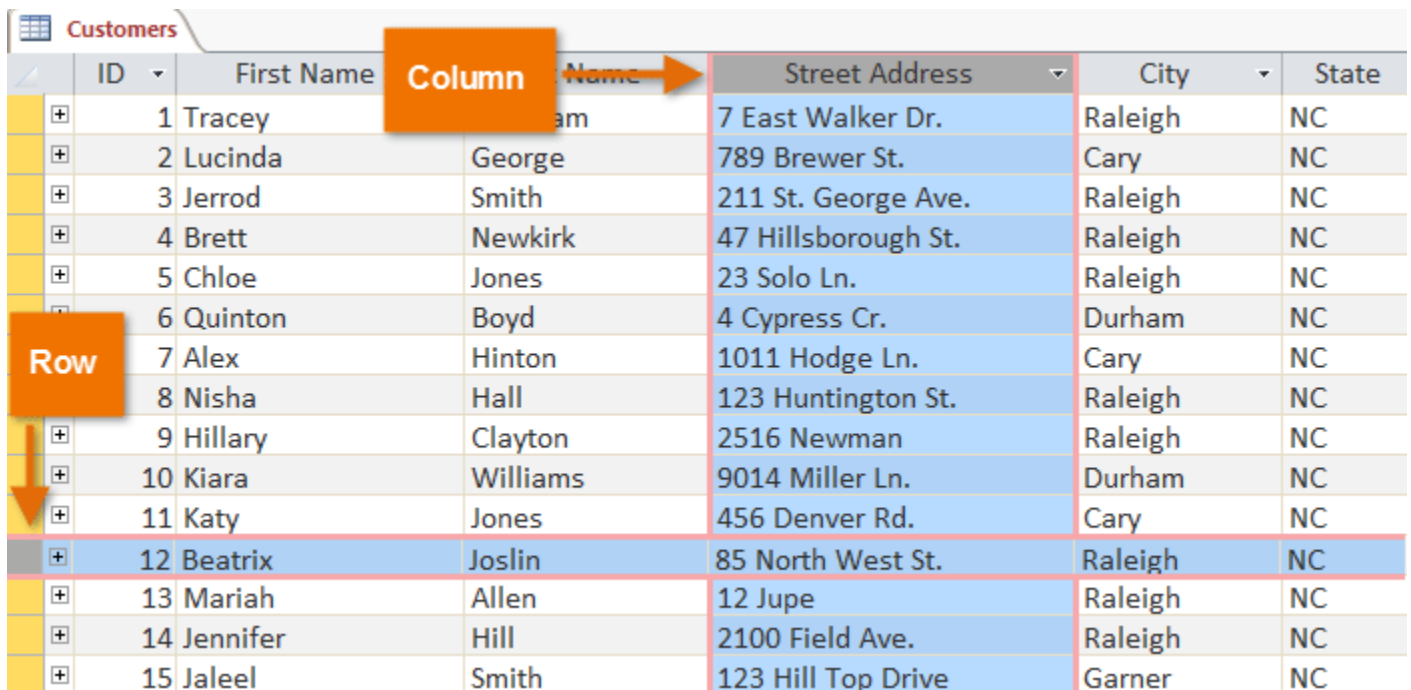
Databases in Access are composed of four objects: **tables**, **queries**, **forms**, and **reports**. Together, these objects allow you to enter, store, analyze, and compile your data however you want.

In this lesson, you will learn about each of the four **objects** and come to understand how they interact with each other to create a fully functional relational database.

Tables

By this point, you should already understand that a database is a collection of data organized into many connected **lists**. In Access, all data is stored in **tables**, which puts tables at the heart of any database.

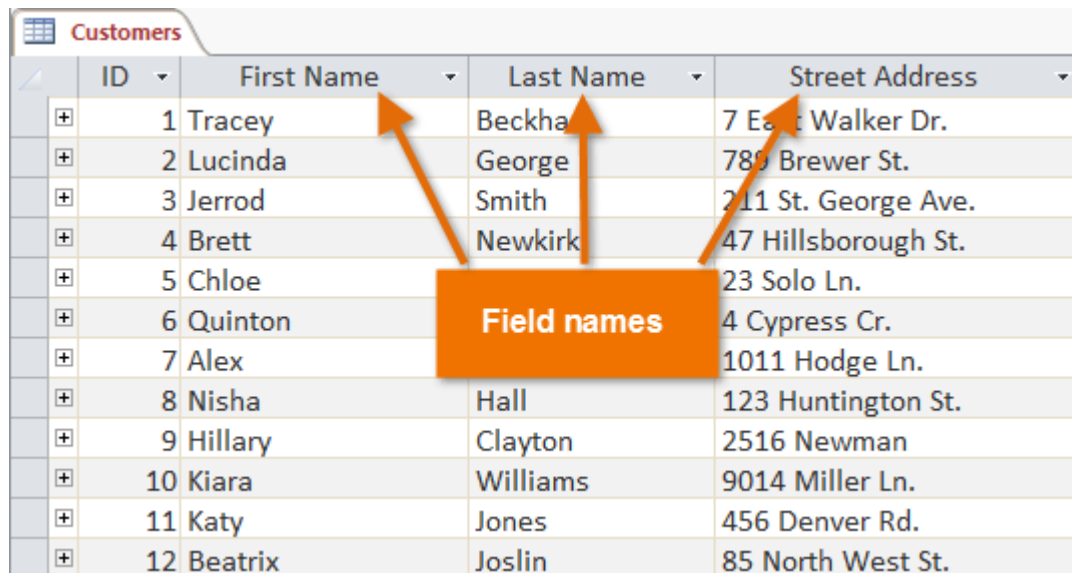
You might already know that tables are organized into vertical **columns** and horizontal **rows**.



The image shows a screenshot of a Microsoft Access table named "Customers". The table has seven columns: ID, First Name, Last Name, Street Address, City, and State. There are 15 rows of data. An orange box labeled "Column" with an arrow points to the "Last Name" column header. Another orange box labeled "Row" with an arrow points to the 12th row of data, which contains the name "Beatrix Joslin".

ID	First Name	Last Name	Street Address	City	State
1	Tracey	Ham	7 East Walker Dr.	Raleigh	NC
2	Lucinda	George	789 Brewer St.	Cary	NC
3	Jerrold	Smith	211 St. George Ave.	Raleigh	NC
4	Brett	Newkirk	47 Hillsborough St.	Raleigh	NC
5	Chloe	Jones	23 Solo Ln.	Raleigh	NC
6	Quinton	Boyd	4 Cypress Cr.	Durham	NC
7	Alex	Hinton	1011 Hodge Ln.	Cary	NC
8	Nisha	Hall	123 Huntington St.	Raleigh	NC
9	Hillary	Clayton	2516 Newman	Raleigh	NC
10	Kiara	Williams	9014 Miller Ln.	Durham	NC
11	Katy	Jones	456 Denver Rd.	Cary	NC
12	Beatrix	Joslin	85 North West St.	Raleigh	NC
13	Mariah	Allen	12 Jupe	Raleigh	NC
14	Jennifer	Hill	2100 Field Ave.	Raleigh	NC
15	Jaleel	Smith	123 Hill Top Drive	Garner	NC

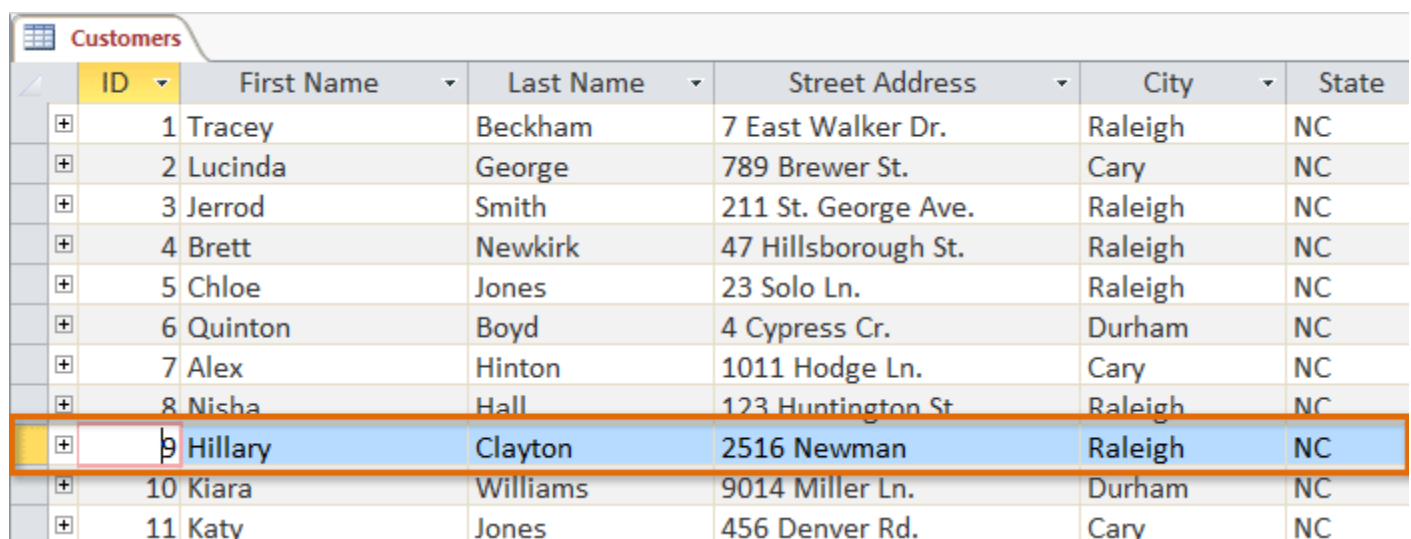
In Access, rows and columns are referred to as **records** and **fields**. A **field** is more than just a column; it's a way of organizing information by the **type** of data it is. Every piece of information within a field is of the same **type**. For example, every entry in a field called **First Name** would be a name, and every entry in field called **Street Address** would be an address.



The screenshot shows the 'Customers' table in Microsoft Access. The table has four columns: ID, First Name, Last Name, and Street Address. An orange box labeled 'Field names' is positioned over the table, with three arrows pointing to the 'First Name', 'Last Name', and 'Street Address' column headers, illustrating that these are fields.

ID	First Name	Last Name	Street Address
1	Tracey	Beckha	7 East Walker Dr.
2	Lucinda	George	789 Brewer St.
3	Jerrold	Smith	211 St. George Ave.
4	Brett	Newkirk	47 Hillsborough St.
5	Chloe		23 Solo Ln.
6	Quinton		4 Cypress Cr.
7	Alex		1011 Hodge Ln.
8	Nisha	Hall	123 Huntington St.
9	Hillary	Clayton	2516 Newman
10	Kiara	Williams	9014 Miller Ln.
11	Katy	Jones	456 Denver Rd.
12	Beatrix	Joslin	85 North West St.

Likewise, a **record** is more than just a row; it's a unit of information. Every cell in a given row is part of that row's record.

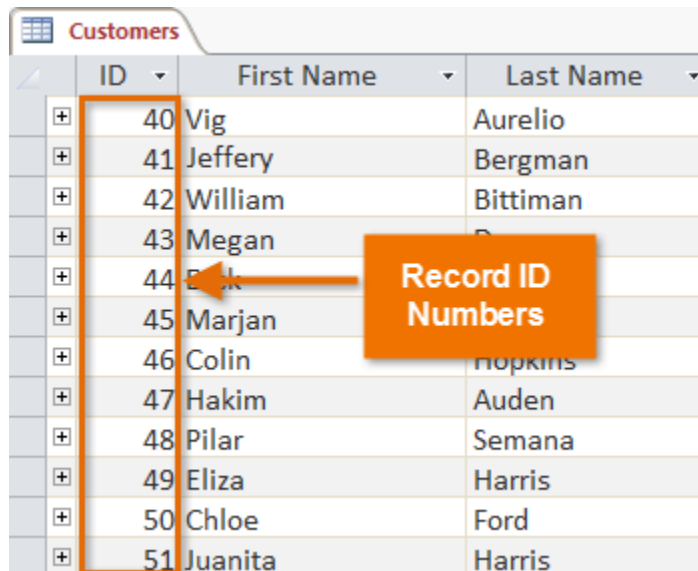


The screenshot shows the 'Customers' table in Microsoft Access with an additional two columns, 'City' and 'State'. The record for 'Hillary Clayton' is highlighted with a blue background and an orange border, demonstrating that a record consists of all data points within a single row.

ID	First Name	Last Name	Street Address	City	State
1	Tracey	Beckham	7 East Walker Dr.	Raleigh	NC
2	Lucinda	George	789 Brewer St.	Cary	NC
3	Jerrold	Smith	211 St. George Ave.	Raleigh	NC
4	Brett	Newkirk	47 Hillsborough St.	Raleigh	NC
5	Chloe	Jones	23 Solo Ln.	Raleigh	NC
6	Quinton	Boyd	4 Cypress Cr.	Durham	NC
7	Alex	Hinton	1011 Hodge Ln.	Cary	NC
8	Nisha	Hall	123 Huntington St.	Raleigh	NC
9	Hillary	Clayton	2516 Newman	Raleigh	NC
10	Kiara	Williams	9014 Miller Ln.	Durham	NC
11	Katy	Jones	456 Denver Rd.	Cary	NC

Notice how each record spans several fields. Even though the information in each record is organized into fields, it belongs with the other information in that

record. See the **number** at the left of each row? It's the **ID number** that identifies each record. The ID number for a record refers to every piece of information contained on that row.



	ID	First Name	Last Name
+	40	Vig	Aurelio
+	41	Jeffery	Bergman
+	42	William	Bittiman
+	43	Megan	
+	44	Elk	
+	45	Marjan	
+	46	Colin	Hopkins
+	47	Hakim	Auden
+	48	Pilar	Semana
+	49	Eliza	Harris
+	50	Chloe	Ford
+	51	Juanita	Harris

Tables are good for storing **closely related information**. Let's say you own a bakery and have a database that includes a table with your customers' names and information, like their phone numbers, home addresses, and email addresses. Because these pieces of information are all details on your customers, you'd include them all in the same **table**. Each customer would be represented by a unique **record**, and each type of information about these customers would be stored in its own field. If you decided to add any more information—say, a customer's birthday—you would simply create a new field within the same table.

Forms, queries, and reports

Although tables store all of your data, the other three objects—**forms**, **queries**, and **reports**—offer you ways to work with it. Each of these objects interacts with the **records** stored in your database's tables.

Forms

Forms are used for **entering**, **modifying**, and **viewing** records. You likely have had to fill out forms on many occasions, like when visiting a doctor's office, applying for a job, or registering for school. The reason forms are used so often is that they're an easy way to guide people toward entering data correctly. When you enter information into a form in Access, the data goes exactly where the database designer wants it to go: in one or more related tables.

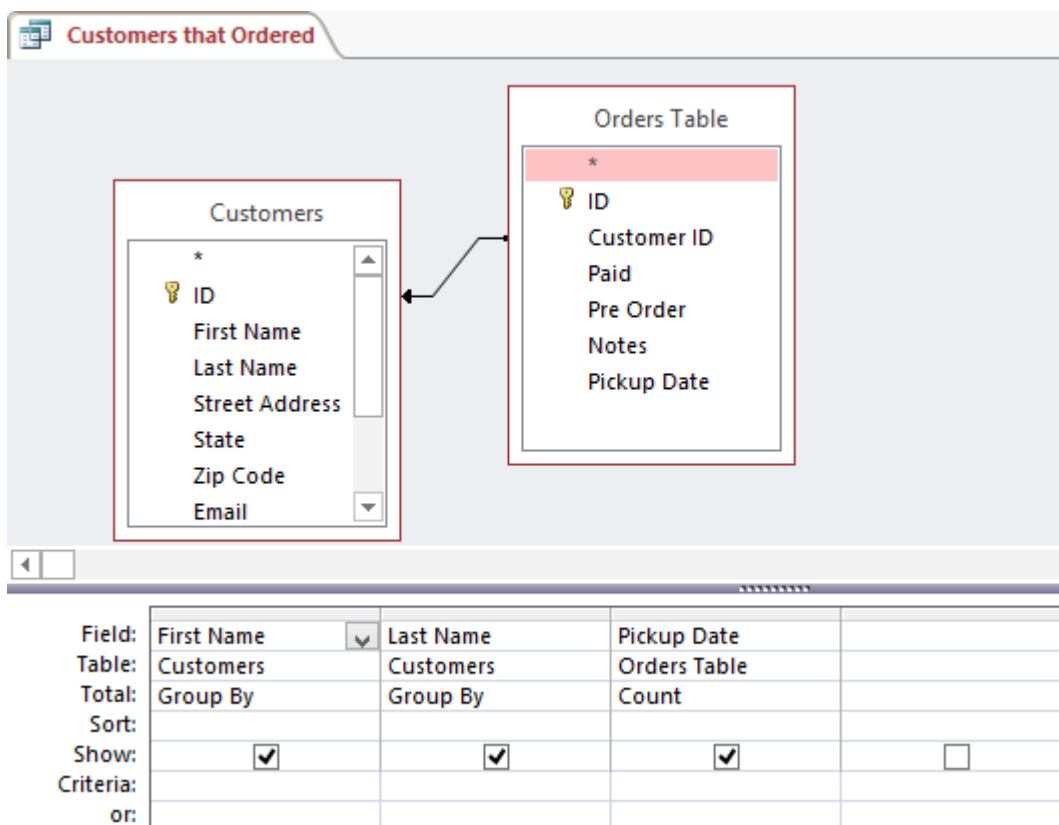
The screenshot shows an Access form titled "Customers". The form has a light blue header with the title "Customers". Below the header, there is a search bar and a "New Record" button. The form contains several text boxes for data entry: "First Name" (Tracey), "Last Name" (Beckham), "Street Address" (7 East Walker Dr.), "City" (Raleigh), "State" (NC), "Zip Code" (27612), "Email" (beck@email.com), and "Phone Number" (919-555-2314). There is also a dropdown menu for "Add to Mailing List?" with the option "Yes-- Weekly & Events" selected. On the left side of the form, there is a graphic of a yellow bird in a cage. At the bottom of the form, there are three buttons: a blue button with a computer icon, a blue button with a red X icon, and a blue button with a printer icon. The status bar at the bottom shows "Record: 1 of 200", "No Filter", and a "Search" button.

Forms make entering data easier. Working with extensive tables can be confusing, and when you have connected tables you might need to work with more than one at a time to enter a set of data. However, with forms it's possible to enter data into multiple tables at once, all in one place. Database designers can even set restrictions on individual form components to ensure all of the needed data is entered in the correct format. All in all, forms help keep data consistent and organized, which is essential for an accurate and powerful database.

Queries

Queries are a way of **searching** for and **compiling** data from one or more tables. Running a query is like asking a detailed **question** of your database. When you build a query in Access, you are **defining specific search conditions** to find exactly the data you want.

Queries are far more powerful than the simple searches you might carry out within a table. While a **search** would be able to help you find the name of one customer at your business, you could run a **query** to find the name and phone number of every customer who's made a purchase within the past week. A well-designed query can give information you might not be able to find just by looking through the data in your tables.



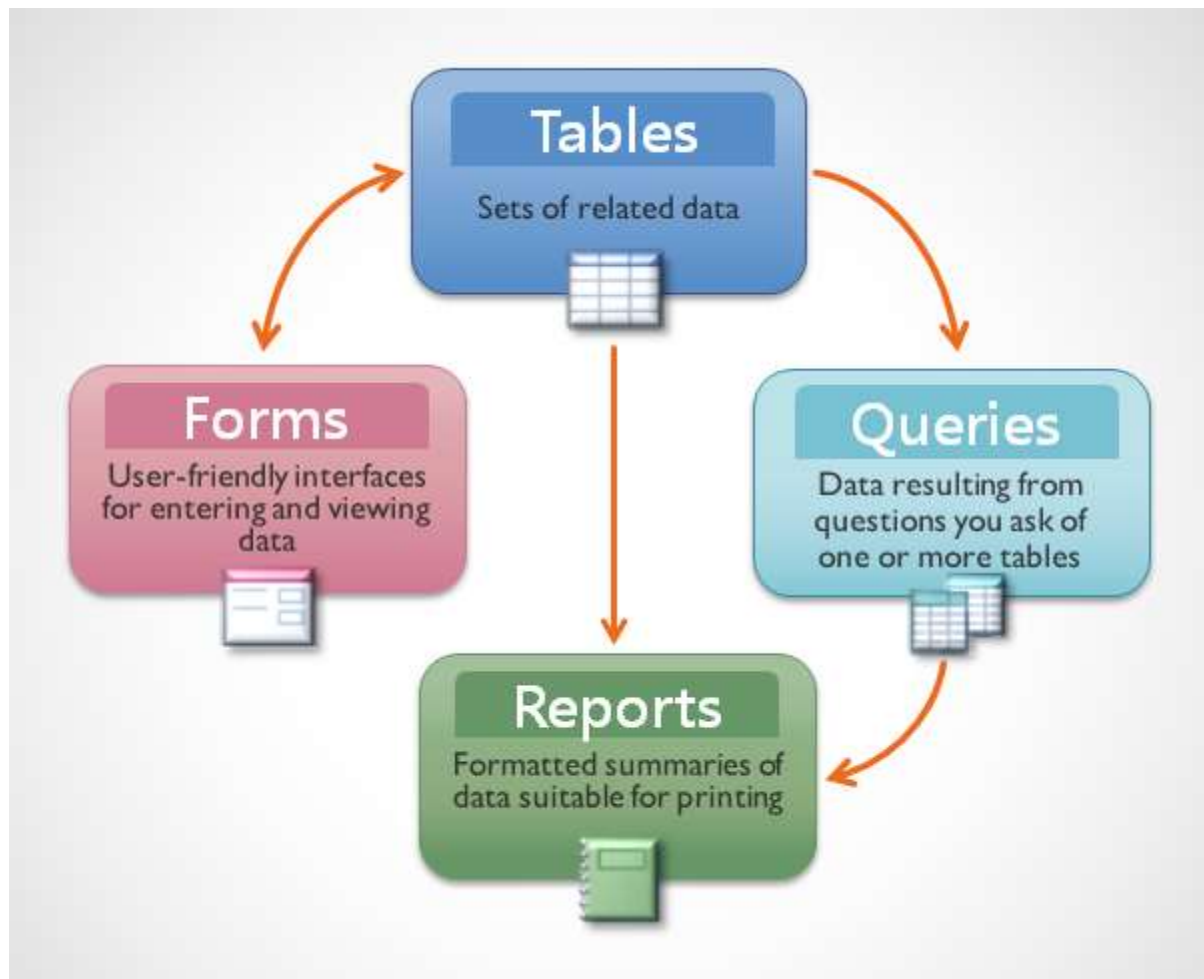
Reports

Reports offer you the ability to **present** your data **in print**. If you've ever received a computer printout of a class schedule or a printed invoice of a purchase, you've seen a database report. Reports are useful because they allow you to present components of your database in an easy-to-read format. You can even customize a report's appearance to make it visually appealing. Access offers you the ability to create a report from any **table** or **query**.

 December Orders			
 Orders			
First Name	Last Name	Phone Number	Pickup Date
Andrzej	Wujek	919-555-0450	12/4/2010
Dick	Whitman	919-555-5042	12/4/2010
Xy'nya	Bell	919-555-0758	12/9/2010
Xiaoxi	Zheng	919-555-2786	12/10/2010
Hakim	Auden	919-555-0045	12/14/2010
Zoey	Altman	919-555-6688	12/15/2010
Raphaelle	Duvalier	919-555-1547	12/15/2010
Zoey	Altman	919-555-6688	12/16/2010

Putting it all together

Even if you have a good idea of how each object can be used, it can initially be difficult to understand how they all work together. It helps to remember that they all work with the same data. Every piece of data a **query**, **form**, or **report** uses is stored in one of your database **tables**.



Forms allow you to both **add** data to tables and **view** data that already exists. Reports **present** data from tables and also from queries, which then **search for** and **analyze** data within these same tables.

These relationships sound complicated, but in fact they work together so well and naturally that we often don't even notice when we're using connected database objects. Have you ever used an electronic card catalog to search for a book at the library? Chances are, you entered your search in something that looks like this:

Search the library catalog. Fill in at least one field. The more words you search for, the smaller and more refined your results list will be.

Search by:

Title Keyword	<input type="text"/>	AND
Author Keyword	<input type="text"/>	AND
General Keyword	<input type="text"/>	AND
Subject Keyword	<input type="text"/>	

Refine your search (optional):

You can refine your search by selecting a limit or sort option.

Limits

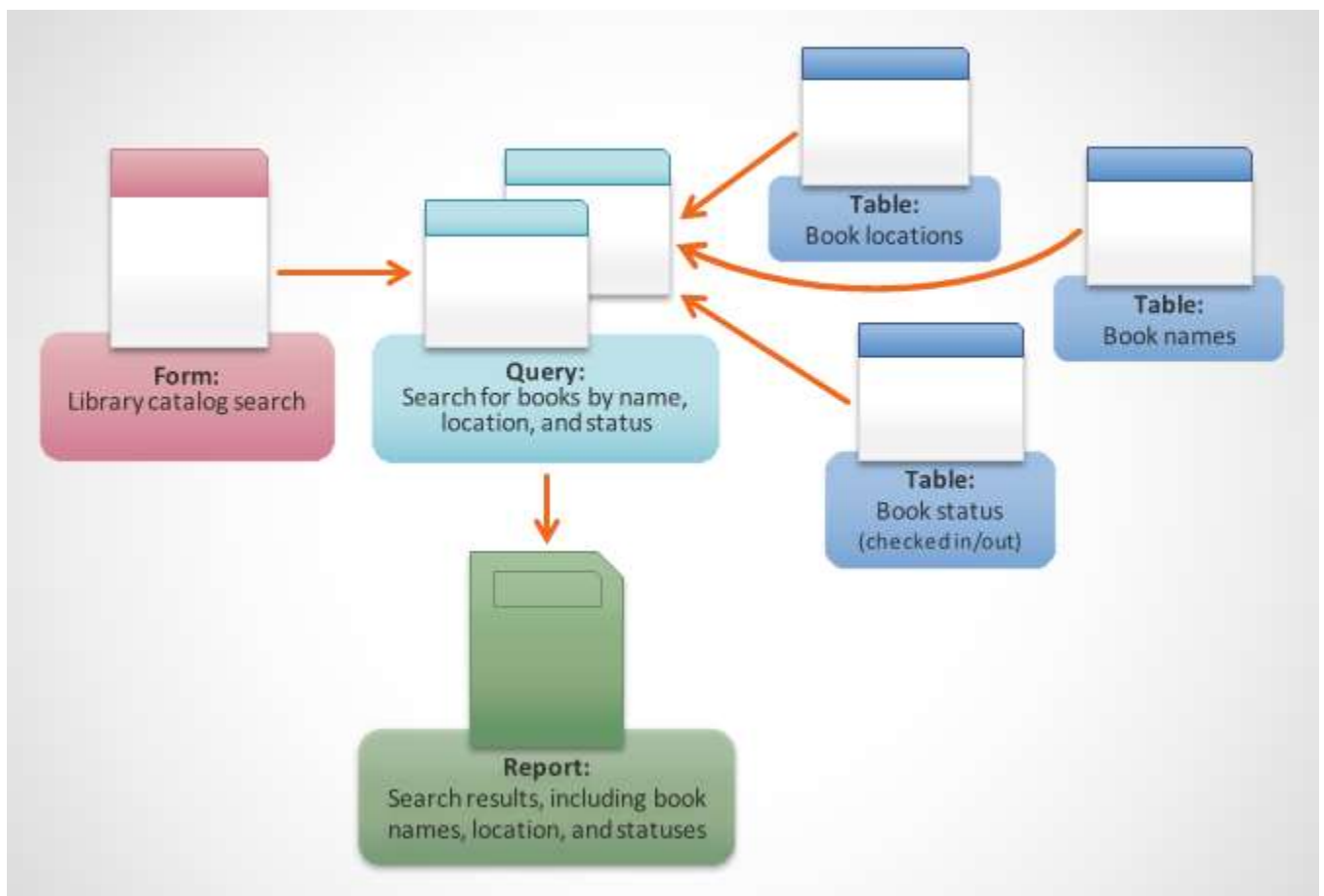
Library Branch	Type of Book
Athens Drive Community Library	All Audio Books
Cameron Village Regional Library	Downloadable Audio Books
Cary Public Library	Adult Audio Fiction
Duraleigh Road Library	Adult Audio Non Fiction
East Regional Library	Children's Audio

Sorting

Sort your results by selecting a sort option.

Select...

When you performed your search, you were entering your search terms into a **form** that then created and ran a **query** based on your request. When the query finished searching the database's **tables** for records that matched your search, you were shown a **report** that drew information from the query and the related tables—in this case, a list of books matching your search terms. You could represent the connections between the objects like this:



Let's say instead of using these tools you had to search within a giant table containing every book in the library system. The relevant records would likely be spread out across many tables: a table for book titles and descriptions, a table containing information on which books are checked in or out, and a table with each branch of the library, just to name a few.

You'd have to search at least three tables just to find a book, learn its location, and see whether it's checked in! It's easy to imagine how difficult it could become to find the right book. If you weren't careful, you might even mess something up by accidentally deleting or editing a record. It's easy to see how the database objects make this search much more manageable.

In our [Introduction to Databases lesson](#), we discussed the concept of a **relational database**, which is a database that is able to understand how different sets of data **relate** to one another. Situations like the example above are exactly why people find relational databases so useful. Without a relational database, what should be a simple task—searching for a book and seeing if it's checked in and where—becomes incredibly complicated and time consuming. Knowing how to use the four Access objects can make even complicated tasks fairly user friendly.