

Access Basics 1: Planning a Database and Building a Table



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1.0 hour

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What is a Database?

The term Database usually describes a collection of related "data" (information). An electronic database should allow you to store, sort, and retrieve data. You can create simple databases by creating a Word table or an Excel spreadsheet.

For example, here we have a database of our patients:

MedRec#	First Name	Last Name	Birth Date	Doctor
123-456	Jack	Nimble	06/08/82	Edwards
987-654	Jill	Pail	08/27/75	Lewis
753-951	Mary	Bluebell	12/08/61	Edwards

Here is a database of our doctors:

DocID #	First Name	Last Name	Phone #
999-999	Ken	Edwards	555-1234
888-888	Laura	Lang	555-4567
777-777	Yolanda	Lewis	555-7890

Why use Microsoft Access?

Microsoft Access is a "relational" database application. Relational means we can link together sets of data, we can **relate** the data. We can keep track of the patients and the doctors, as well as when the patients last saw their doctors, what happened at each visit and so on. Access allows us to *relate* our data, without the repetition that may occur anywhere else.

In an Access database, we can create the datasets and link them.

MedRec#	First Name	Last Name	Birth Date	Doctor
123-456	Jack	Nimble	06/08/72	Edwards
987-654	Jill	Pail	08/27/75	Lewis
753-951	Mary	Bluebell	12/08/61	Edwards

DocID #	First Name	Last Name	Phone#
999-999	Ken	Edwards	555-1234
888-888	Laura	Lang	555-4567
777-777	Yolanda	Lewis	555-7890

In Microsoft Access, data is stored in **Tables**. As data in the Tables change, the other database objects will reflect the newest information (i.e. the Queries, Forms and Reports).

Queries show the data in a Table format. A Query can pull from multiple Tables and allow you to limit the records (rows) display by using criteria and showing only the fields (columns) you want. We can find the phone number for Jill Pail's Doctor, and provide Dr. Edwards with a list of his patients.

Forms can be created to provide a "user-friendly" side to your database. They are used to view and enter your data in an interactive formatted structure. Forms are also used to make menus and search windows. They can turn a simple data collection tool into a more interactive user-friendly application.

While you can print a Table, Query, or Form, **Reports** are uniquely created to print out your data. This tool can group and organize data. They can be used to create Form letters and mailing labels. Access works beautifully with Word for mail merges, but the Reports tool allows for multi-level summaries. For example, a list of all the patient's upcoming appointments.

Planning the Database Tables

The most important part of creating a relational database is **planning**. This can be difficult when you are new to relational databases. Here are some questions that may help:

1. Input - What data do I already have for the database?
2. Output - What information do I want to get out of the database?
3. Process - What do I need to do to get there?

Sometimes it helps to plan the final Reports that you want from your database. For example, we want to have a chart of how many patients attended their appointments. Do we track the cancellations vs. the no shows? What about the late arrivals and the rescheduled? If we want to differentiate, we need to make sure we are going to collect that data. This is why it's so important to plan, to try to predict the "what ifs" that may occur once you have your data collected.

The Tables are the core of your Access database; these structures store the data. Tables are essential to using any of the other Access Tools. When planning your database try to remember the basic design rules for your Tables.

Design Rules

These are discussed during the PowerPoint presentation.

Organizing Data

Once you have an idea of the data you would like to collect, you need to decide how many tables you might use to organize the data efficiently. In Excel, we might keep several numbered columns to keep track of things, i.e. Medication1, Medication 2..., but in Access, we should create a second table to track the numbered fields.

No Derived Fields

By using the relationships between our tables, we can derive missing data. If we are creating a new appointment for a patient, we only need to put in their Medical Record Number (or other unique identifier). The patient's name, phone number, and other information can be retrieved, *derived*, from the Patient Table.

Data is broken down into Smallest Logical Parts

Pulling fields together in Access is often simple; pulling them apart usually requires human intervention. Think of this as breaking up the data into its smallest *sort-able* part. Anything you want to sort or filter should be in its own column.

Descriptive Field Names

It is tempting to use abbreviations when we are creating our data tables, but if the title we use is too vague or too abbreviated, we may not be able to recall why we created that field. DOB – Date of Birth or Department of Babies? SSN – Social Security Number or Shands System Number?

Unique Field Names

Be sure to differentiate between the field names in each Table. We can have a 'First Name' in our Patient Table and a 'First Name' in our Doctor Table but this can lead to confusion when we try to pull both Tables into one a report. Think 'Pt First Name' and 'Dr First Name'.

No Calculated Fields

In Microsoft Excel, we can perform our calculations on the same sheet as our data, but a Table in Access is stagnant data, it does not change unless you make it change. Access will let you create calculations in Queries, Forms, and Reports. Newer versions of Access do have a Calculated field type for the table. This will embed a calculation in the record and is not always automatically populated in a data entry form.

Unique Records

It is important that each Table has a way to keep records (rows) unique. We can do this by setting one field (column) to be a **Primary Key** field. When a field is set as a Primary Key, Access will not allow any duplication nor blanks. When there is not a unique field in your collected data set, you can use an *AutoNumber*. AutoNumbers are incremented or random fields that are always unique.

Microsoft Access Tables

Tables store data. The Tables are the true 'database' (base of data). These need to be created and properly linked (related) in order to effectively use the other Access tools. Tables are the core of your database; everything else in Access depends on the Tables.

Vocabulary

A collection of fields make up a record. A collection of records make up a Table. A collection of Tables make up a database

Datapoint – One Cell with in the data grid	A Phone Number
Field – One column of a Table common to all the records	Everyone's phone number
Record – One row of a Table containing all data about a particular entry	One person's data, name, phone number...
Table – One set of related data	Everyone's data, names, phone numbers
Database – Structured collection of related Tables	

Datasheet View

The **Datasheet View** of a Table allows you to create and modify the data based on the settings of fields created in the Design View.

Visit Info						
VisitID	Med Rec	Visit Date	Visit Time	Length	Reason	Doctor
1	465-710	1/8/2008	11:15 AM	15	Followup	Sidney, Samueson, x801234
2	107-284	1/15/2008	4:00 PM	75	Physical	Sidney, Samueson, x801234
3	828-079	1/26/2008	3:30 PM	30	Nausea	Sidney, Samueson, x801234
4	105-469	1/30/2008	9:15 AM	45	Followup	Sidney, Samueson, x801234
5	154-788	2/6/2008	11:00 AM	30	Sore Throat	Sidney, Samueson, x801234
6	155-612	2/15/2008	12:00 PM	45	Physical	Sidney, Samueson, x801234

Record: 1 of 162 No Filter Search

Design View

The **Design View** of a Table allows you to create and modify fields.

- **Field Names** (the column headings)
- **Data Type** – Sets the type of value allowed to be entered into the fields. For this class we will use Short Text, and Date/Time.
 - Short Text allows an entry up to 255 characters. If this is not enough you can use Long Text which allows for 65,536 characters.
 - Date/Time only allow dates and times
 - Number are fields you plan to use for mathematical calculations. Values such as phone numbers, zip codes, and employee IDs should be left as short text.

Beware, **Number** fields are automatically created as "long Integers". Change the *Field Size* property to *Single* or *Double* to allow decimal places for fields such as HA1C (6.8) or GPA (3.5).

- **Description** – your descriptions will show in the status bar of the datasheet view.

Field Name	Data Type	Description (Optional)
Pt Med Rec #	Short Text	
Pt First Name	Short Text	
Pt Last Name	Short Text	
Pt Birth Date	Date/Time	

Field Properties

General	Lookup
Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	Yes
Allow Zero Length	Yes
Indexed	Yes (No Duplicates)
Unicode Compression	No
IME Mode	No Control
IME Sentence Mode	None
Text Align	General

The field description is optional. It helps you describe the field and is also displayed in the status bar when you select this field on a form. Press F1 for help on descriptions.

Properties

We will go more in depth with the properties in the Tables classes. The properties listed changed based on the data type chosen above. Each field has its own set of properties.

The properties we will change in this class include:

SHORT TEXT FIELD

- **Field Size:** Number of characters allowed in a Short Text field
- **Input Mask:** A pattern for the data to be entered. Use the ellipsis button (...) at the end of the line to launch the wizard to help create the proper code for this property.

DATE/TIME FIELD

- **Format:** How the value is displayed. You can choose a Date/Time format from the list, or use a combinations of M, D, Y to create your own format.

Short Date: M/D/YYYY

M=Month, D=Day, Y=Year, H=Hour, N=Minute, S=Second

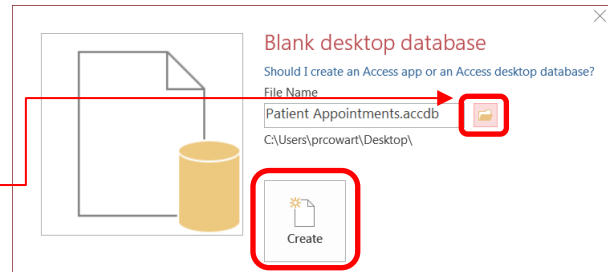
General	Lookup
Field Size	255
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	Yes
Allow Zero Length	Yes
Indexed	Yes (No Duplicates)
Unicode Compression	No
IME Mode	No Control
IME Sentence Mode	None
Text Align	General

General	Lookup
Format	
Input Mask	
Caption	
Default Value	
Validation Rule	
Validation Text	
Required	Yes
Indexed	Yes (No Duplicates)
IME Mode	No Control
IME Sentence Mode	None
Text Align	General
Show Date Picker	For dates

Class Exercise

Create the Database

1. Open Microsoft Access
2. Choose **Blank Desktop Database** (single click)
3. Click on the yellow folder at the end of the **File Name** box and browse for the Desktop
 - Make a note of where you saved this file.
4. Name the File: **Access Basics 1**
5. Click **Create**

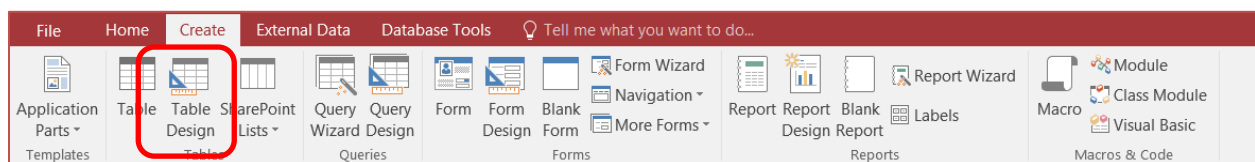


Explore the Window

1. Close **Table1** with the X or right-click on the name of the table, chose **Close**
2. **Explore the Ribbon**
 - **Home** Tab – Clipboard, Sort & Filter, Records (Spell check), Find, Text Formatting
 - **Create** Tab – Create Tables, Queries, Forms, Reports
 - **External Data** Tab – Import and Export data
 - **Database Tools** Tab – Advanced Features - Relationships and Data Analyzers

Create the Patients Table

1. Click on the **Create** Tab and choose **Table Design**



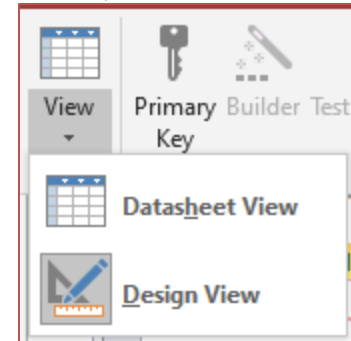
2. Type the first Field Name: **Pt Med Rec #**
 - Data Type: **Short Text**, Description: **Patient's Medical Record Number**
3. Enter in the rest of the fields (descriptions not necessary):

Patients			
	Field Name	Data Type	Description (Optional)
	Pt Med Rec #	Short Text	Patient's Medical Record Number
	Pt First Name	Short Text	
	Pt Last Name	Short Text	
	Pt Phone #	Short Text	
	Pt Birth Date	Date/Time	

4. Set the Pt Med Rec # to be the key
 - Click on the big key on the Design tab, or right-click inside the Pt Med Rec # field
5. Save the Table as **Patients**

Entering First Record

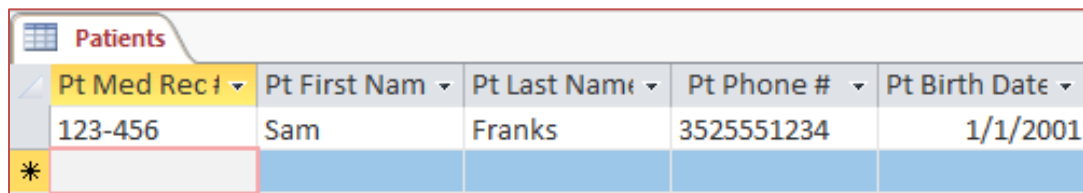
1. Turn to the Datasheet View
 - Right-click on the table name and choose Design.
 - Use the View button in the ribbon. It's on the Home tab and the Design tab.
 - Use the view buttons in the status bar, bottom right corner of the window.



2. Enter our first Pt Med Rec #: **123-456**
3. Press tab move to the next field

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Phone #	Pt Birth Date
123-456	Sam	Franks	3525551234	1/1/1

- Pt First Name Name: **Sam**
- Pt Last Name: **Franks**
- Pt Phone #: **3525551234** (*all one number*)
- Pt Birth Date: **1/1/1**
 - Access should add in the "200" for 2001, if it did not change, return to the Design view and set the *Data Type* to *Date/Time*.



Pt Med Rec #	Pt First Name	Pt Last Name	Pt Phone #	Pt Birth Date
123-456	Sam	Franks	3525551234	1/1/2001
*				

Exit the Database

1. Exit the database, Access will probably not ask you to save
 - Access automatically saves the record, but if you changed the column sizes it will ask you to save the Layout.
2. Open Microsoft Access
 - From the File menu, choose your **Access Basics 1** database, If necessary, *Enable Content*
3. Open the **Patients** table (double-click) from the navigation pane
 - Sam should still be there!

1. In **Design View**, move Pt Birth Date above the Pt Phone #
 - Click on the row heading, the grey box in front of the field name. Then Click/Drag the line above the Pt Phone #

Patients			
	Field Name	Data Type	Description
🔑	Pt Med Rec #	Short Text	Patient's Medical Record Number
	Pt First Name	Short Text	
	Pt Last Name	Short Text	
	Pt Birth Date	Date/Time	
	Pt Phone #	Short Text	

2. In **Datasheet View**, Enter the next record
 - Again, no separators in the phone number

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Birth Date	Pt Phone #
789-012	Jacob	Smith	2/2/92	3525554321

Patients				
Pt Med Rec #	Pt First Name	Pt Last Name	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	1/1/2001	3525551234
789-012	Jacob	Smith	2/2/1992	3525554321
*				

Adding Fields

1. In **Design View**, Insert a row above Pt Birth Date
2. Name the field **Pt Handed**
 - Insert Rows from **Design** tab, or from the right-click menu
3. Set the new field to be **Short Text**
4. In **Datasheet View**, enter **Right** (the whole word) for both patients. Use the arrow keys to move between the records.

Patients					Properties
Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	Right	1/1/2001	3525551234
789-012	Jacob	Smith	Right	2/2/1992	3525554321
*					

The screenshot shows a database application window with a table named 'Patients'. The table has four columns: 'Pt Med Rec #', 'Pt First Name', 'Pt Last Name', and 'Pt Birth Date'. A context menu is open over the 'Pt Birth Date' column, displaying the following options: 'Primary Key', 'Cut', 'Copy', 'Paste', 'Insert Rows' (which is highlighted with a red background), 'Delete Rows', and 'Properties'.

Enter a "trouble maker" Record

1. In **Datasheet View**, enter the next record

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
555-555	Jane	Williams	A	March 3, 1983	352-555-5555

- Enter Pt Handed (Ambidextrous) as just one character **A**
- Enter Pt Birth Date as **March 3, 1983**; it should change to 3/3/1983
- Type in the hyphens for the Pt Phone Number **352-555-5555**

2. Flip between the Design view and Datasheet View

- Notice Jane's record moves. This is because by default Access sorts by the primary key field. Since Pt Med Rec # is our key, every time the data is refreshed it will sort the data by the primary key field.

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	Right	1/1/2001	3525551234
555-555	Jane	Williams	A	3/3/1983	352-555-5555
789-012	Jacob	Smith	Right	2/2/1992	3525554321

Modify Field Properties – Field Size

1. In Design View, set **Field Size** property of Pt Handed at the bottom of the window to be 1
2. When you return to the Datasheet View and Save, you will get the following warning message saying data may be lost. We want this to happen, click Yes.
3. Data is lost, our Pt Handed entries that were Right should now only read R

Field Name	Data Type
Pt Med Rec #	Short Text
Pt First Name	Short Text
Pt Last Name	Short Text
Pt Handed	Short Text
Pt Birth Date	Date/Time
Pt Phone #	Short Text

General	Lookup
Field Size	1
Format	
Input Mask	
Caption	

Microsoft Access

Some data may be lost.

The size of one or more fields has been changed to a shorter size. If data is lost, validation rules may be violated as a result. Do you want to continue anyway?

Yes No

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	R	1/1/2001	3525551234
555-555	Jane	Williams	A	3/3/1983	352-555-5555
789-012	Jacob	Smith	R	2/2/1992	3525554321

Modify Field Properties – Format

- In Design View, set the **Format** property for Pt Birth Date to be a **Medium Date**
 - Notice there is no "field size" for a date field, because it does not matter how many characters you type in, as long as it is a valid date.
 - Like Microsoft Excel, Access recognizes dashes (1-1-2001) and slashes (1/1/2001)

Patients	
Field Name	Data Type
Pt Med Rec #	Short Text
Pt First Name	Short Text
Pt Last Name	Short Text
Pt Handed	Short Text
Pt Birth Date	Date/Time
Pt Phone #	Short Text

General	Lookup
Format	Medium Date
Input Mask	
Caption	

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	R	01-Jan-01	3525551234
555-555	Jane	Williams	A	03-Mar-83	352-555-5555
789-012	Jacob	Smith	R	02-Feb-92	3525554321

Modify Field Properties – Input Mask

We will explore the Input Mask more in depth in the Tables class.

- In Design View, set an **Input Mask** for the Phone Number
 - Click in the **Input Mask** Property for Pt Phone #
 - Click the **Build** button (...) at the end of the line to launch the wizard
 - If needed, select Phone Number
 - Click FINISH
- Fix Jane's Phone Number by taking out the extra dash

Patients	
Field Name	Data Type
Pt Med Rec #	Short Text
Pt First Name	Short Text
Pt Last Name	Short Text
Pt Handed	Short Text
Pt Birth Date	Date/Time
Pt Phone #	Short Text

General	Lookup
Field Size	255
Format	
Input Mask	(999) 000-0000
Caption	
Default Value	
Validation	

Input Mask Wizard	
Which input mask matches how you want data to look?	
To see how a selected mask works, use the Try It box.	
To change the Input Mask list, click the Edit List button.	
Input Mask:	Data Look:
Phone Number	(206) 555-1212
Social Security Number	831-86-7180
Zip Code	98052-6399
Extension	63215
Password	*****
Long Time	1:12:00 PM
Try It:	
<input type="button" value="Edit List"/> <input type="button" value="Cancel"/> <input type="button" value="Back"/> <input type="button" value="Next >"/> <input type="button" value="Finish"/>	

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	R	01-Jan-01	(352) 555-1234
555-555	Jane	Williams	A	03-Mar-83	352-555-5555
789-012	Jacob	Smith	R	02-Feb-92	(352) 555-4321

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	R	01-Jan-01	(352) 555-1234
555-555	Jane	Williams	A	03-Mar-83	(352) 555-5555
789-012	Jacob	Smith	R	02-Feb-92	(352) 555-4321

Enter a New Record

1. Enter a new record

Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
527-594	Doris	Jones	Left	4/4/74	3525556789

- Try to type the whole word Left, because we limited the field size to 1, you can only enter the first letter.
- Any 'valid' date format, think Excel, can be entered and Access will format it to our property settings.
- The input mask should pop up as soon as you type the first number. You will not be able to type in letters, numbers only.

2. Close the Table

3. Open the Patient's Table to view the new sort order, remember it sorts by the primary key

Patients					
Pt Med Rec #	Pt First Name	Pt Last Name	Pt Handed	Pt Birth Date	Pt Phone #
123-456	Sam	Franks	R	01-Jan-01	(352) 555-1234
527-594	Doris	Jones	L	04-Apr-74	(352) 555-6789
555-555	Jane	Williams	A	03-Mar-83	(352) 555-5555
789-012	Jacob	Smith	R	02-Feb-92	(352) 555-4321
*					

4. Close the Table

Back up the Database

1. From the **File** menu choose **Save As**
2. Choose **Back Up Database** and click the **Save As** button
3. Save the database with today's date

Compact and Repair

Microsoft Access files can grow very quickly, and sometimes become bloated. Compact eliminates unused space that Access set aside and you never used, or from deleted structures. Repair looks for damages and potential data corruption.

1. From the **File** menu choose **Info**
 - Choose **Compact and Repair**

You should do this every time you add a large amount of data, the database crashes, it begins to run slowly, or starts acting "funny".

