Introduction to Database Concepts and Microsoft Access 2010

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Database Concepts and Access 2010

- Introduction
  - Database
  - Microsoft Access
- Design and Creation
  - Plan
  - Tables
  - Queries
  - Forms
  - Reports

Things to Do

- Contact your customer support
- Talk to your ISM
- Backup
- Backup
- Backup
What is a Database?

• A structured collection of related data
• An filing cabinet, an address book, a telephone directory, a timetable, etc.
• In Access, your Database is your collection of related tables

Data vs. Information

• Data – a collection of facts made up of text, numbers and dates:
  Murray 35000 7/18/86
• Information - the meaning given to data in the way it is interpreted:
  Mr. Murray is a sales person whose annual salary is $35,000 and whose hire date is July 18, 1986.

Basic Database Concepts

• Table – A set of related records
  Name: Barry Harris
  Phone: 392-5555
  Email: bharris@ufl.edu

• Record – A collection of data about an individual item
  Name: Barry Harris
  Phone: 392-5555
  Email: bharris@ufl.edu

• Field – A single item of data common to all records
  Name: Barry Harris
Example of a Table

<table>
<thead>
<tr>
<th>Name</th>
<th>GatorLink</th>
<th>Phone</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>rsmith</td>
<td>392-3900</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>Thomas</td>
<td>bthomas</td>
<td>392-5555</td>
<td>Medicine</td>
</tr>
<tr>
<td>Van Winkle</td>
<td>sleepyguy</td>
<td>846-5656</td>
<td>PHHP</td>
</tr>
</tbody>
</table>

Design and Document Your Database

- A designers best tools are a pencil and paper
  - It is important to plan what you are going to do

- The sooner you touch the computer the sooner you’ll make a mistake
  - If you don’t plan you will often have to start again

- Document what you are doing
  - Will you remember what you did in three months time?

Questions To Ask Yourself

- What have I got?
  - (Inputs)
- What do I want?
  - (Outputs)
- What do I need to do to get there?
  - (Process)
- How am I going to build it?
  - (Application/Program)
**Database Options**

<table>
<thead>
<tr>
<th></th>
<th>Freeware/Shareware</th>
<th>Microsoft Excel</th>
<th>Microsoft Access</th>
<th>Oracle/SQL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simplicity</td>
<td>Basics</td>
<td>Intermediate</td>
<td>Advanced</td>
<td>Hire a programmer</td>
</tr>
<tr>
<td># of Users</td>
<td>1</td>
<td>1</td>
<td>Multiple</td>
<td>Multiple of Multiples</td>
</tr>
<tr>
<td>Multiple datasets</td>
<td>No</td>
<td>No</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Security</td>
<td>Always consult with your computer security team if you are working with any sensitive data.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Why Use Access?**

- Familiar look and feel of Windows
- Easy to start building simple databases
- Can build sophisticated systems
- It’s already on your computer
- True relational database

**What is a Relational Database?**

- A relational database is a collection of tables from which data can be accessed in many different ways without having to reorganize the database tables.
  - That is, once relationships are created, tables can “talk” to each other. We can link (relate) the tables to find:
    - Which doctors have seen a patient
    - Which students are in a class
    - Which item is selling the most on Friday’s
Basic Design Rules

• Organizing Data
  Once you’ve chosen your fields, you need to decide if they belong in different tables. Data should be kept in separate tables if you have an indeterminate number of entries. One employee can have a number of evaluations.

<table>
<thead>
<tr>
<th>Emp ID</th>
<th>First Name</th>
<th>Last Name</th>
<th>Eval</th>
<th>Eval Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>123-456</td>
<td>Sallye</td>
<td>Shapiro</td>
<td>1/15/10</td>
<td>1/14/11</td>
</tr>
<tr>
<td>125-985</td>
<td>Samuel</td>
<td>Smith</td>
<td>1/12/11</td>
<td></td>
</tr>
<tr>
<td>248-890</td>
<td>Sidney</td>
<td>Samueson</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Emp ID Eval Date
123-456 1/15/2010
123-456 1/14/2011
123-985 1/12/2011

Basic Design Rules

• No Derived Fields
  If a field you are not using as a link exists in another table, it should not be repeated in the current table. Listing it in both places leads to data entry errors. Since we have the Emp ID in both tables, there is no need to include the Employee’s Last Name in the Evaluation table.

<table>
<thead>
<tr>
<th>Emp ID</th>
<th>First Name</th>
<th>Last Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>123-456</td>
<td>Sallye</td>
<td>Shapiro</td>
</tr>
<tr>
<td>125-985</td>
<td>Samuel</td>
<td>Smith</td>
</tr>
<tr>
<td>248-890</td>
<td>Sidney</td>
<td>Samueson</td>
</tr>
</tbody>
</table>

You can use a query to pull values from both tables into one datasheet.

Basic Design Rules

• Data is broken down into Smallest Logical Parts
  Each segment of data you want to sort or filter should be kept in its own field. For example, what if I needed to sort by City or Zip Code? Pulling fields together is fairly simple, pulling them apart can difficult.

ID Home Address
587 123 West Newberry Rd, Gainesville FL 32601
954 456 South 3rd Rd, Apt 12, Newberry, FL 32684

<table>
<thead>
<tr>
<th>ID</th>
<th>Address 1</th>
<th>Address 2</th>
<th>City</th>
<th>State</th>
<th>Zip</th>
</tr>
</thead>
<tbody>
<tr>
<td>587</td>
<td>123 West Newberry Rd</td>
<td></td>
<td>Gainesville</td>
<td>FL</td>
<td>32601</td>
</tr>
<tr>
<td>954</td>
<td>456 South 3rd Rd, Apt 12</td>
<td></td>
<td>Newberry</td>
<td>FL</td>
<td>32684</td>
</tr>
</tbody>
</table>

You can join fields together in queries, forms and reports.
Basic Design Rules

• **Descriptive Field Names**
  Be careful of using too many abbreviations in your field names. You have up to 64 characters, but long field names can be difficult to use in expressions. Be Clear, Be Concise and Be Consistent.

<table>
<thead>
<tr>
<th>ID</th>
<th>FN</th>
<th>LN</th>
<th>DOB</th>
<th>DOH</th>
<th>SSN</th>
<th>CMT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1234</td>
<td>Sallye</td>
<td>Shapiro</td>
<td>6/17/1970</td>
<td>7/02/2001</td>
<td>123-450</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Emp ID | Emp First Name | Emp Last Name | Emp Birth Date | Emp Hire Date | Emp System Signal # | Emp Comments |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1234</td>
<td>Sallye</td>
<td>Shapiro</td>
<td>6/17/1970</td>
<td>7/02/2001</td>
<td>123-450</td>
<td>N/A</td>
</tr>
</tbody>
</table>

**Basic Design Rules**

• **Unique Field Names**
  Often we will have the same type of data in multiple tables. Table IDs, Comments, First Names, Last Names are all fields that could refer to different datasets.

<table>
<thead>
<tr>
<th>First Name</th>
<th>Last Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annie</td>
<td>Adams</td>
</tr>
<tr>
<td>April</td>
<td>Appleton</td>
</tr>
<tr>
<td>Arnold</td>
<td>Arlington</td>
</tr>
<tr>
<td>Bobbie</td>
<td>Brown</td>
</tr>
<tr>
<td>Butch</td>
<td>Bruce</td>
</tr>
<tr>
<td>Sallye</td>
<td>Shapiro</td>
</tr>
<tr>
<td>Samuel</td>
<td>Smith</td>
</tr>
<tr>
<td>Sidney</td>
<td>Samuelson</td>
</tr>
</tbody>
</table>

When these two Last Name fields are pulled into the same query they will appear with the table name in front of the field name:

- Patient Table.Last Name
- Doctor Table.Last Name

**Basic Design Rules**

• **No Calculated Fields**
  In Microsoft Excel we enter the data and create our formulas all at once. In Access you are creating a "Data" table, a table of the raw data. If you want Access to do the calculations, you can create an expression elsewhere in the database.

<table>
<thead>
<tr>
<th>Emp ID</th>
<th>Hourly Rate</th>
<th>Hours Worked</th>
<th>Pay</th>
</tr>
</thead>
<tbody>
<tr>
<td>123</td>
<td>$10.00</td>
<td>40</td>
<td>$400.00</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PI Med</th>
<th>Height (m)</th>
<th>Weight (kg)</th>
<th>BMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>45-455</td>
<td>2</td>
<td>51</td>
<td>25</td>
</tr>
</tbody>
</table>

You can create calculated expressions in queries, forms and reports.
Basic Design Rules

- Unique Records

If you don’t have unique records, your database can’t tell which record you may be referring to.

<table>
<thead>
<tr>
<th>LastName</th>
<th>GatorLink</th>
<th>Phone</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>rsmith</td>
<td>3-5051</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>Smith</td>
<td>rsmith</td>
<td>273-5051</td>
<td>COP</td>
</tr>
<tr>
<td>Smith</td>
<td>rsmith</td>
<td>273-5051</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>Thomas</td>
<td>bthomas</td>
<td>392-5555</td>
<td>Medicine</td>
</tr>
<tr>
<td>Van Winkle</td>
<td>sleepyguy</td>
<td>846-5656</td>
<td>PHHP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LastName</th>
<th>EmergencyContact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>Mary Anne Smith</td>
</tr>
</tbody>
</table>

Primary Keys

To ensure that each record is unique in each table, we can set one field to be a **Primary Key** field.

A Primary Key is a field that will contain **no duplicates** and **no blank values**.

Looking at the table above, what would be the best Primary Key?

<table>
<thead>
<tr>
<th>LastName</th>
<th>GL ID</th>
<th>Phone</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smith</td>
<td>rsmith</td>
<td>273-5051</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>Thomas</td>
<td>bthomas</td>
<td>392-5555</td>
<td>Medicine</td>
</tr>
<tr>
<td>Van Winkle</td>
<td>sleepyguy</td>
<td>846-5656</td>
<td>PHHP</td>
</tr>
</tbody>
</table>

While each column in this particular data set has unique data, the field that will work best for us is GL ID (GatorLink). Many employees will work for the same college, have the same last name and possibly even share telephone numbers, but each employee should have a unique GatorLink ID.

When there is not a unique field in your data set, you can use an **AutoNumber. Access can create incremented or random AutoNumbers for your primary key.**
Basic Design Rules

- Unique Records

We use the unique primary key as our link between our tables, this helps ensure we connect to the correct record.

<table>
<thead>
<tr>
<th>ID</th>
<th>LastName</th>
<th>GatorLink</th>
<th>Phone</th>
<th>College</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Smith</td>
<td>rsmith</td>
<td>3-5051</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>2</td>
<td>Smith</td>
<td>rsmith</td>
<td>273-5051</td>
<td>COP</td>
</tr>
<tr>
<td>3</td>
<td>Smith</td>
<td>rsmith</td>
<td>273-5051</td>
<td>Pharmacy</td>
</tr>
<tr>
<td>4</td>
<td>Thomas</td>
<td>bthomas</td>
<td>392-5555</td>
<td>Medicine</td>
</tr>
<tr>
<td>5</td>
<td>Van Winkle</td>
<td>sleepyguy</td>
<td>846-5656</td>
<td>PHHP</td>
</tr>
</tbody>
</table>

Emp ID EmergencyContact
2 Mary Anne Smith

Let’s Start Planning

<table>
<thead>
<tr>
<th>Patients</th>
<th>Appointments</th>
</tr>
</thead>
</table>

Opening a Database

- To open a database when you start Access
  - Choose the database on the left hand panel, or click Open to browse for another database.
- To create a database
  - Click on the Blank Database button. Fill in the File name on the right side and click Create.
The Access Database Window

The navigation pane on the left side of the window organizes all the database objects.

Data View/Design View

Tables

Forms

Queries

Reports

Navigating Fields and Records

• To move through records and fields
  - Tab
  - Shift-Tab
  - Enter
  - Home/End
  - Ctrl-Home
  - Page Up
  - Ctrl-End
  - Page Down
  - The Arrow keys

• To move through records
  - Previous Record
  - Next Record
  - New Record
  - First Record
  - Current Record
  - Last Record
Introducing Tables

• Database is a collection of Tables
• Data Storage
• The foundation of your database

Introducing Queries

• A means of asking questions (querying) of your data
• Can look across a number of Tables and other Queries
• Can perform Calculations and Combine fields

Introducing Forms

• A friendlier view of the database
• Used for data input, menus, display and printing
• Can perform Calculations and Combine fields
Introducing Reports

- Output of information in a printed report
- Allows you to group and summarize data
- Can perform Calculations and Combine fields
- Cannot Edit Data
- Can Make Labels

Working Together

Forms → Tables

Tables → Queries

Queries → Reports

Let’s take a break!