

An Overview of MS-Access

What is Microsoft Access?

Microsoft Access is a relational database management system (DBMS or RDBMS). At the very core, it is a software “engine” that provides an interface between physical data and user application queries.

Other examples of DBMS applications include:

- Oracle
- mySQL
- SQL Server (Microsoft)
- DB2 (IBM)
- Informix

Why choose MS–Access over SPSS / Excel?

Although there is always overlap, the following rules might help when deciding when / when not to use MS Access:

- MS Access is best used for long-term data storage and/or data sharing.
- MS Excel is best used for minor data collection, manipulation, and especially visualization.
- SPSS is best used for minor data collection and especially data analysis.

It is easy to export data from MS Access to Excel → SPSS

Why choose MS–Access over other DBMS systems?

Cheap, readily available (packaged with MS-Office Premium).

Easy to use (relative to other systems –Oracle may require one FTE to maintain the server as a database administrator and another FTE to serve as an application developer).

Includes front-end tools for rapid application development (RAD). This also makes MS-Access a good prototype environment.

Why choose other DBMS systems over MS-Access?

MS-Access can handle a large number of records, but is somewhat slow compared to some of the high-end platforms.

Multiple users may use the database simultaneously, but MS-Access is known to become unstable with greater than 3-5 users.

There is a “snob factor”. I personally recommend the use of other systems (Oracle, SQL Server, mySQL, etc) when writing grant proposals - especially phase II type grants).

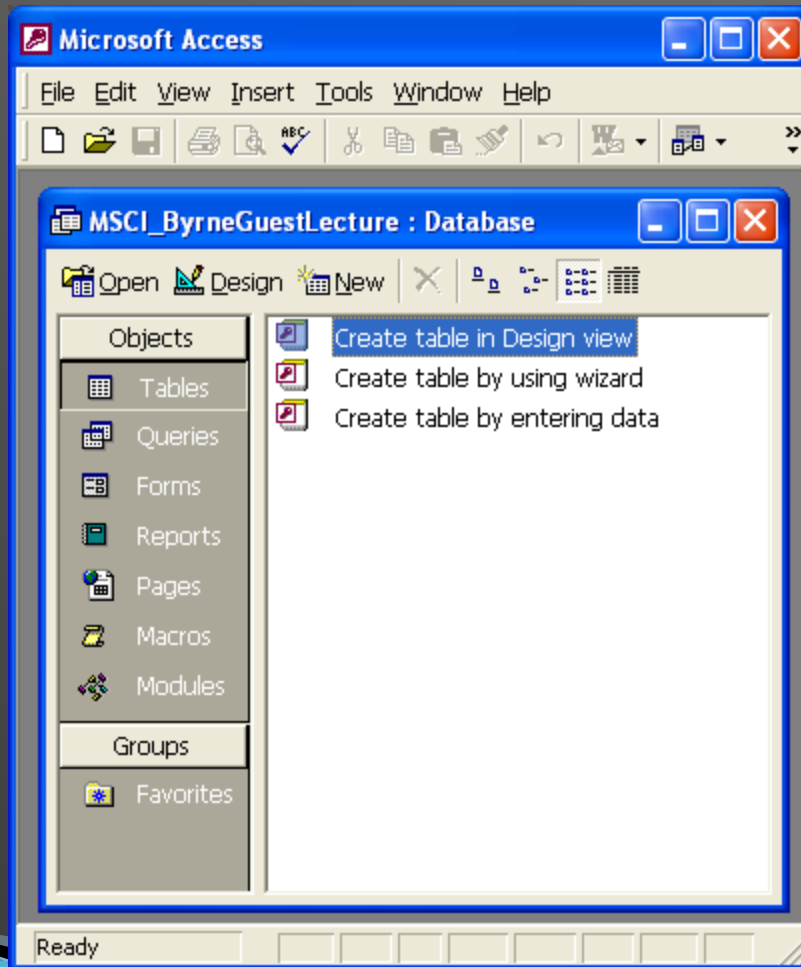
What is in an MS-Access file – 1?

Although the term “database” typically refers to a collection of related data tables, an Access database includes more than just data. In addition to tables, you can add:

- Saved queries (stored procedures) - organizing and/or manipulating data
- Forms – gui interaction with data, event programming
- Reports – customized results for printing (~ static forms)
- Macros and VB programs for extending functionality

Microsoft provides some logical integration of these tools through “wizards”. However, these are pretty basic - most developers must pick and choose the best approach when implementing applications.

What is in an MS-Access file – 2?

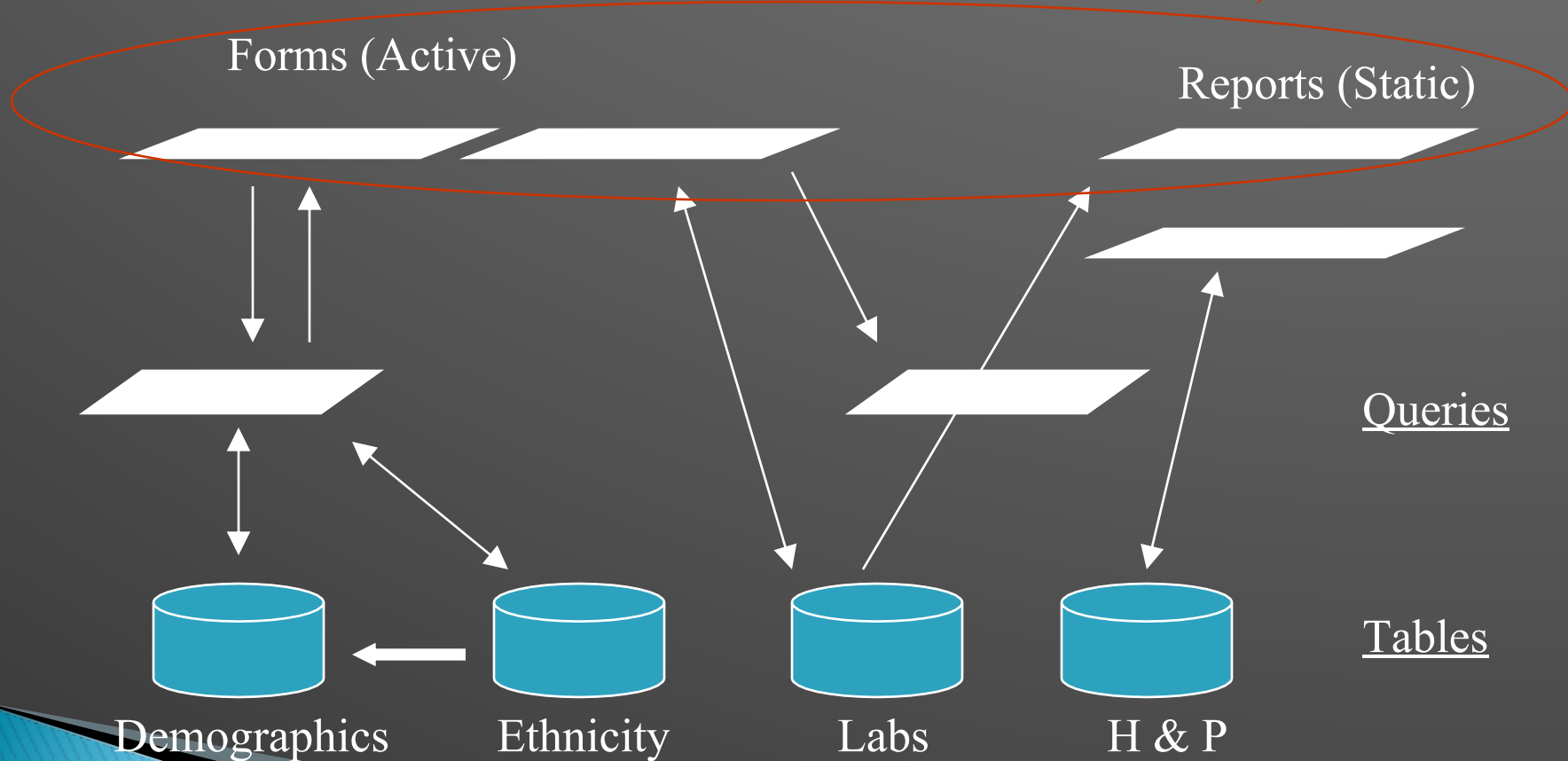


Unless advanced techniques are employed, all entities are stored in one *.mdb file. When running, a locking file (*.ldb) is also visible. Only the mdb file needs to be copied to transfer the database to another computer or location.

Ex.
MSCI_ByrneGuestLecture.mdb

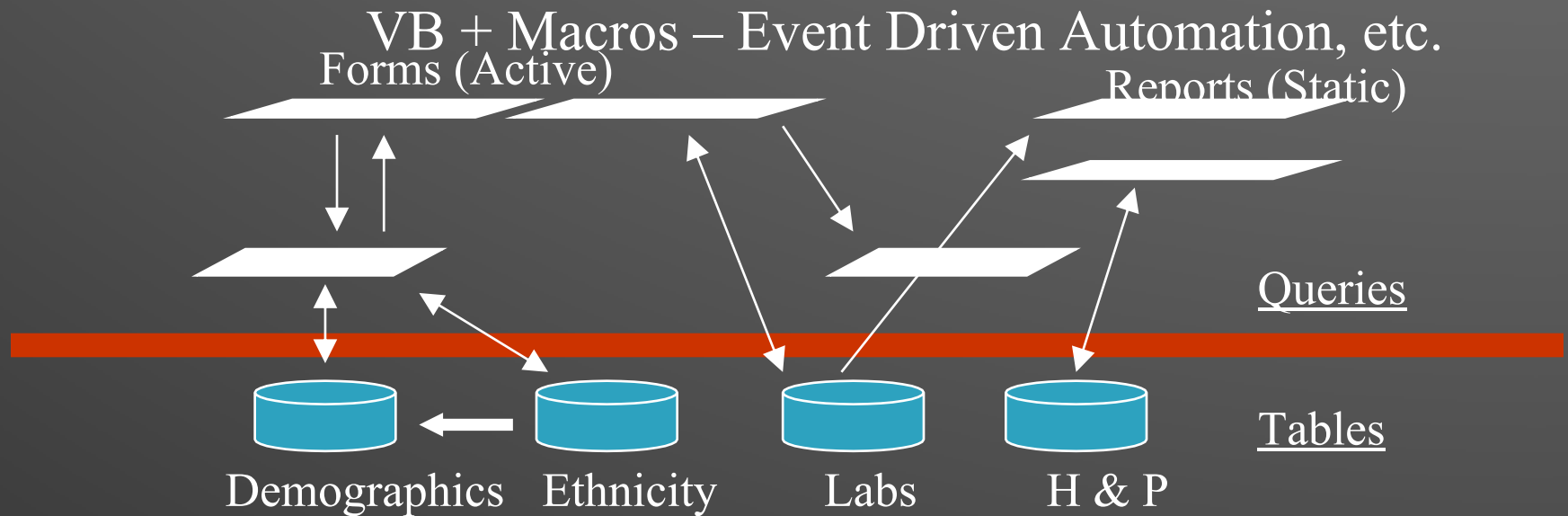
What is in an MS-Access file – 3?

VB + Macros – Event Driven Automation, etc.



Advanced – Splitting

Front-End File - Contains all Application Entities (Forms, Queries, etc.) and links to data tables in back-end file. Note you may have more than one FE to accommodate different user types.



Back-End File - Contains all Data Tables

Creating / Working with Tables

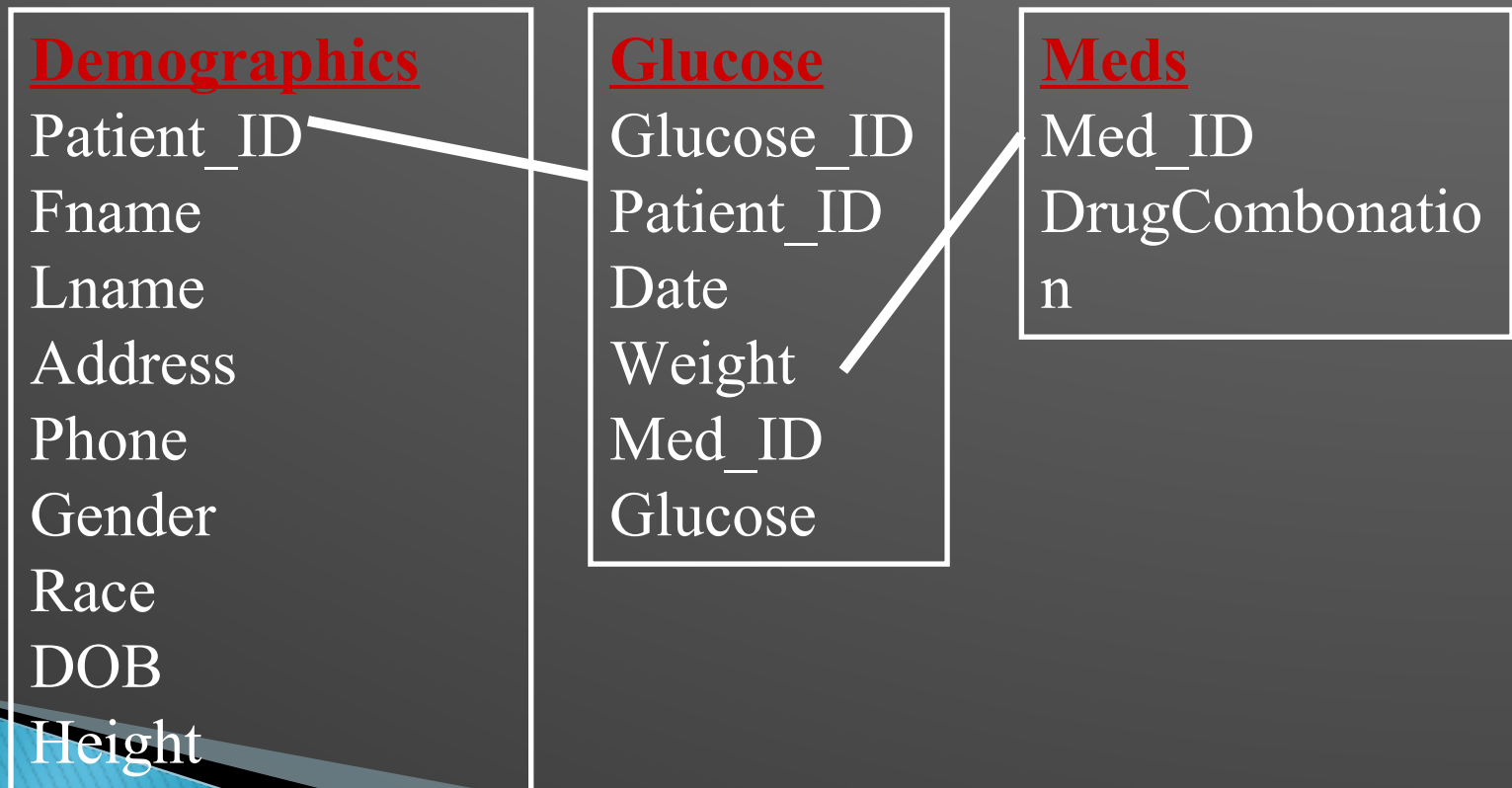
Tables – Glucose Measurement Database

We wish to construct a database to track waking glucose measurements for an indefinite amount of time on 100 patients receiving 3 possible drug combinations.

Why would this be difficult in MS-Excel or SPSS?

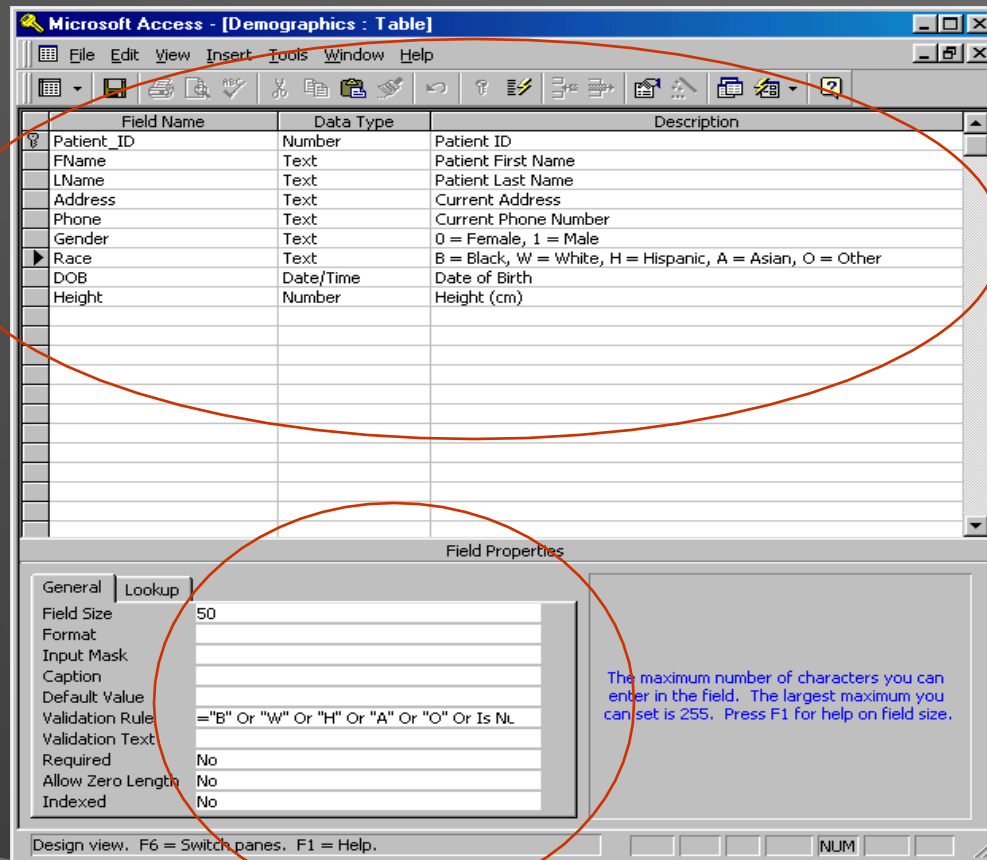
Tables Overview

- ◆ Think of Access as a collection of spreadsheets that are relationally linked.



STORE DATA ONE TIME / ONE PLACE
DO NOT STORE CALCULATED DATA

Table Demonstration – Live



General Setup for Tables
Describe General Options
Show Validation Rule

Relationships

Lookup Option

Table Relationships – Live

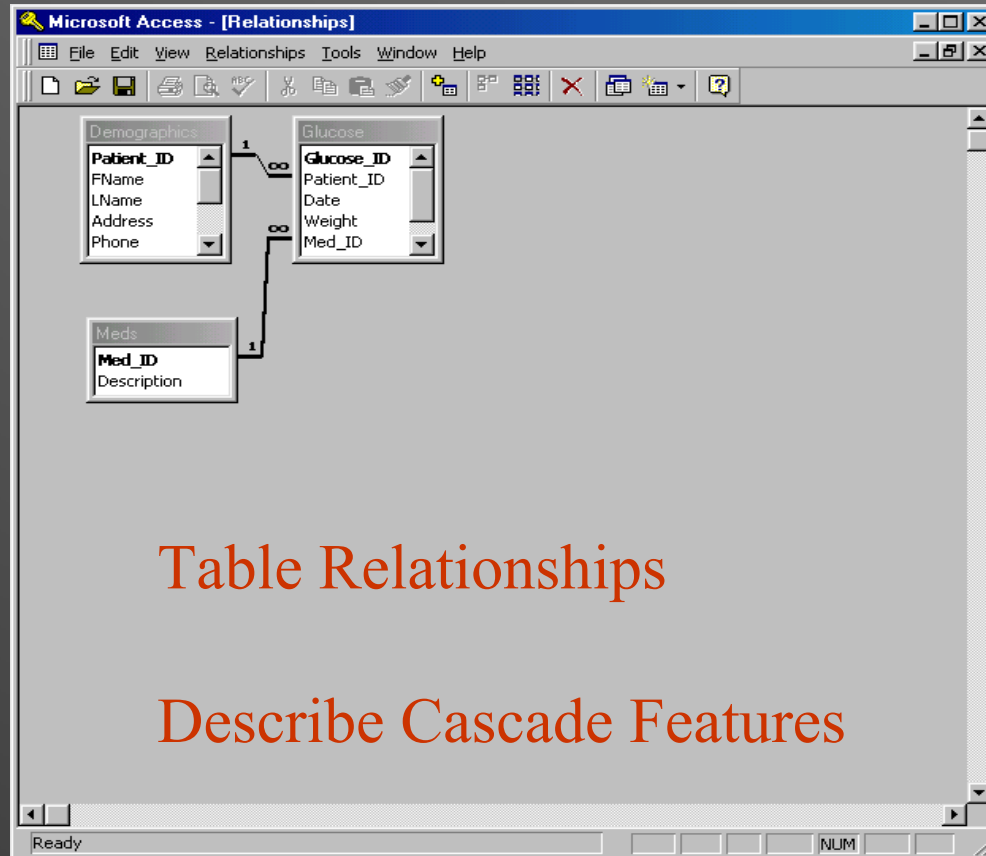
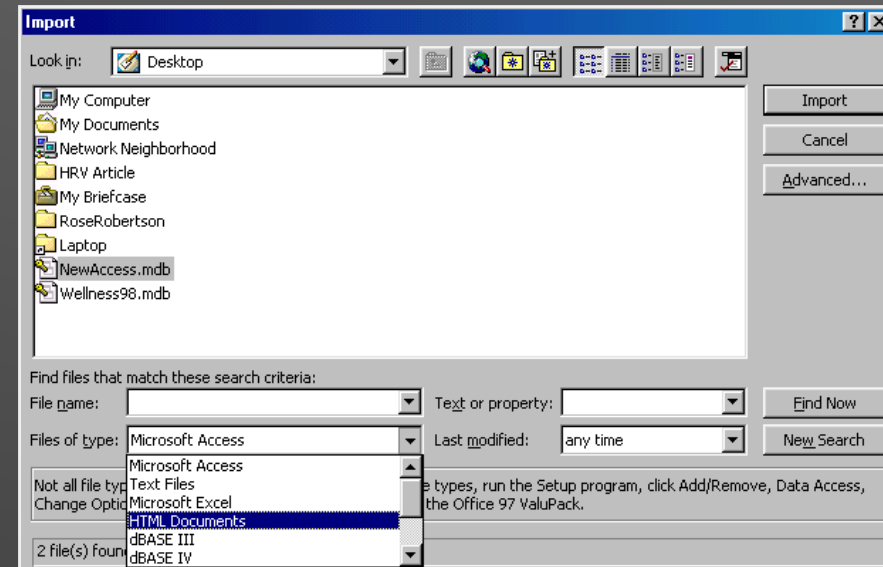
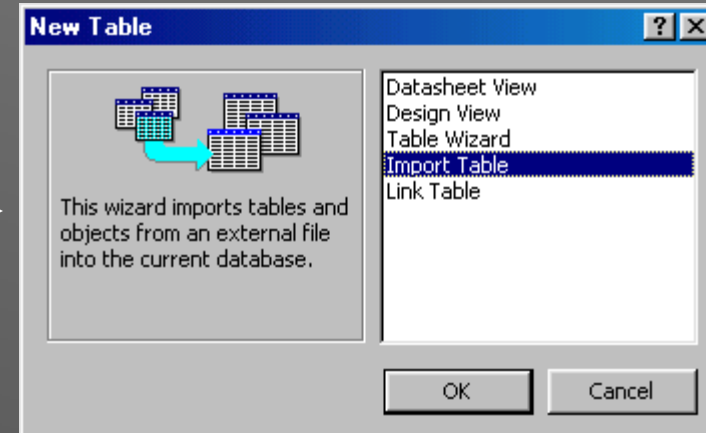


Table Import / Link – Live

Importing a Table makes a copy of existing data

Linking a Table lets you control existing data through Access (Exercise Caution !)

Note that you may import non-Access files.



MS Access –

Data storage principles

1. Attempt to store data 1 time / 1 place;
2. Do not store data that may be calculated from other fields (utilize queries); and
3. Strive for very discrete data storage (no ambiguity – garbage in / garbage out).
4. Choose real or arbitrary (autonumber) unique identifier for each record.

Relationships

Use table relationships to automatically cascade delete and update records.

Other Data Sources

Import = Copy; Link = Live Connect.

Creating / Working with Queries

Query Overview – 1

- ◆ An MS-Access query is a set of stored SQL instructions that manipulate and/or select data from one or more tables.
- ◆ Select Query – Data grouping and/or filtering
- ◆ Make-Table Query – Select + creates/populates new table.
- ◆ Update Query – Updates fields from specified table data
- ◆ Append Query – Runs query on one table, appends results to a table
- ◆ Delete Query – Delete selected records from table

Query Overview – 2

- ◆ SQL (Structured Query Language) is a very widely used database language designed specifically for communicating with databases
- ◆ SQL is not proprietary – almost every DBMS supports SQL (including MS-Access).
- ◆ SQL is relatively easy to learn, but extremely powerful – one of the easiest ways to learn is to use MS-Access Query by Example methods, then look at the generated SQL command
- ◆ Remember that a query is nothing more than the database engine running the stored SQL command (it looks and sometimes acts like a table, but really adds little mass to the database file)

One Table Query Example – Live

Use this button to toggle between design, sheet and SQL views.

Custom sort by one or more fields.

Drag and Drop Fields

Microsoft Access

NewAccess : Database

Query1 : Select Query

Patient General Information

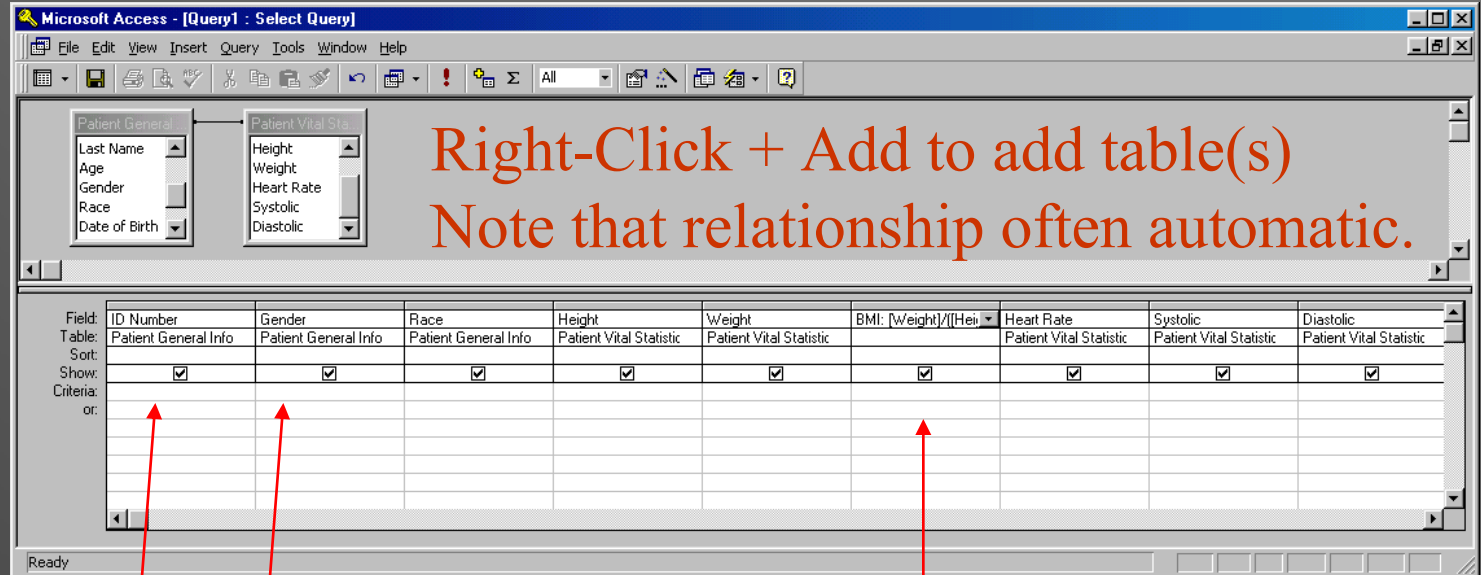
- First Name
- Last Name
- Age
- Gender
- Race
- Date of Birth

Right-Click + Add to add table(s)

Field:	ID Number	Admission Date	Gender	Date of Birth	
Table:	Patient General Info	Patient General Info	Patient General Info	Patient General Info	
Sort:	Ascending				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:					
or:					

Ready

2-Table Query Example – Live

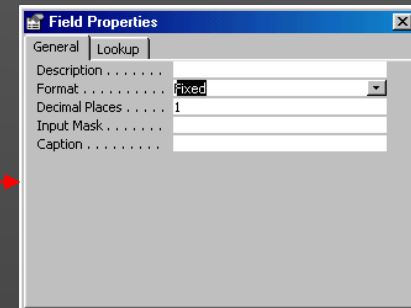


Drag and Drop Fields

Calculated Field

Right-Clicking gray area above field enables property changes.

BMI: $[Weight]/([Height]/100)^2$

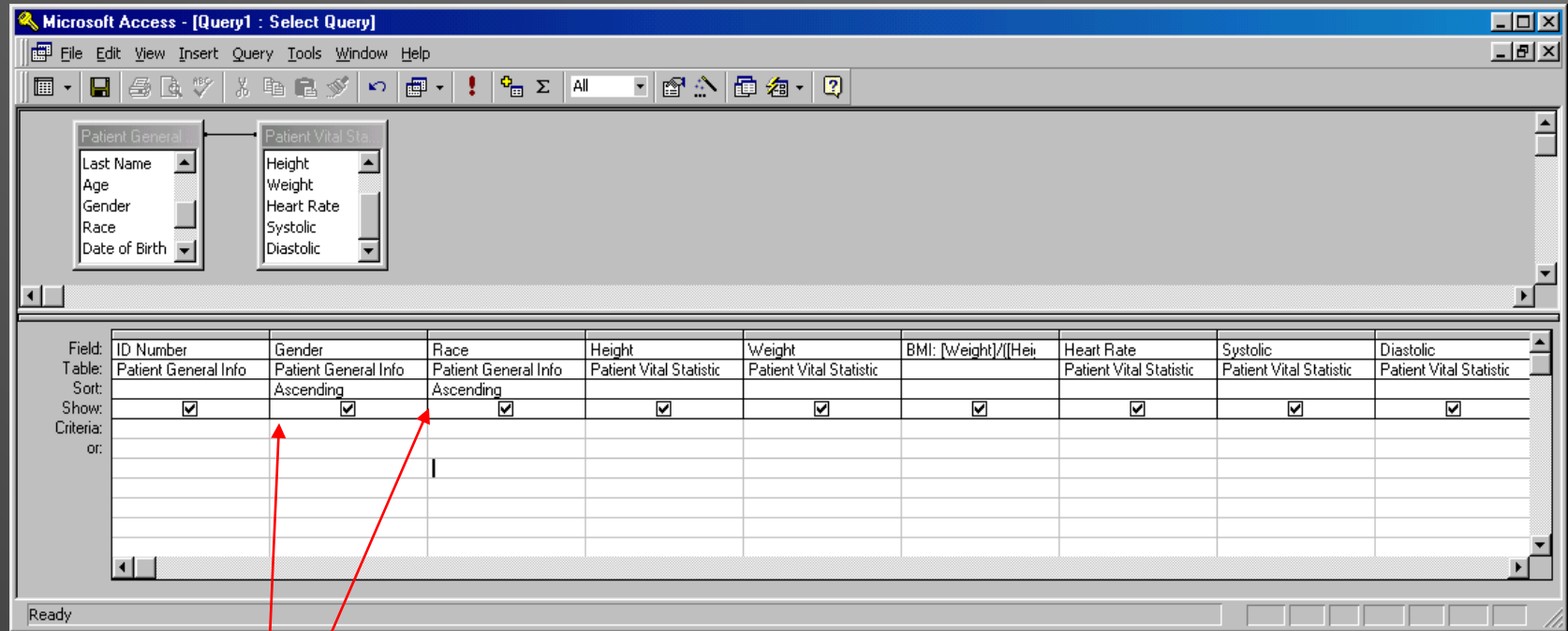


Query – Calculating Fields

Name the calculated field, then type a colon, then type the equation using brackets ([]) around table fields. If there is ambiguity in the field names between tables, you may need to type table.[field] format.

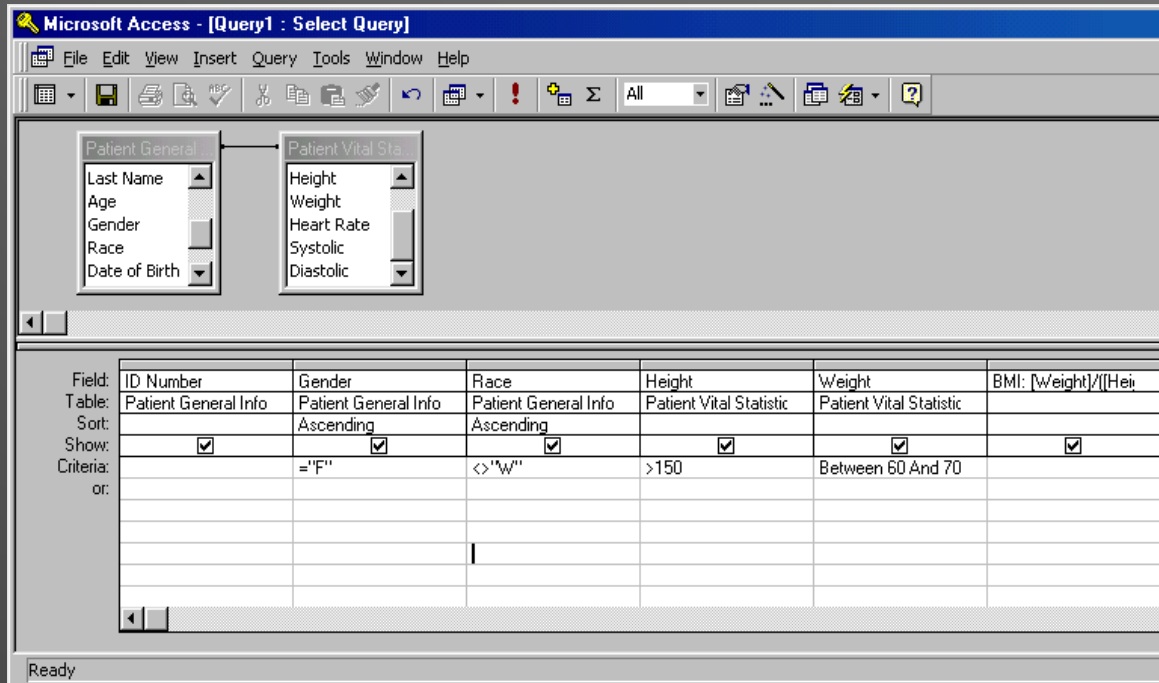
Ex: BMI: [Weight]/([Height]/100)^2

Query – Sorting Data



Choose Ascending or Descending in the Sort Row
This query would sort by Gender THEN by Race.

Query – Filtering Data



This query will return all records in the database for:
Females
who are not white
whose height are greater than 150 cm
and who weigh between 60 and 70 kg

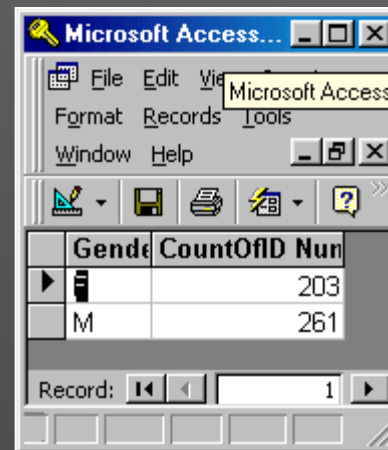
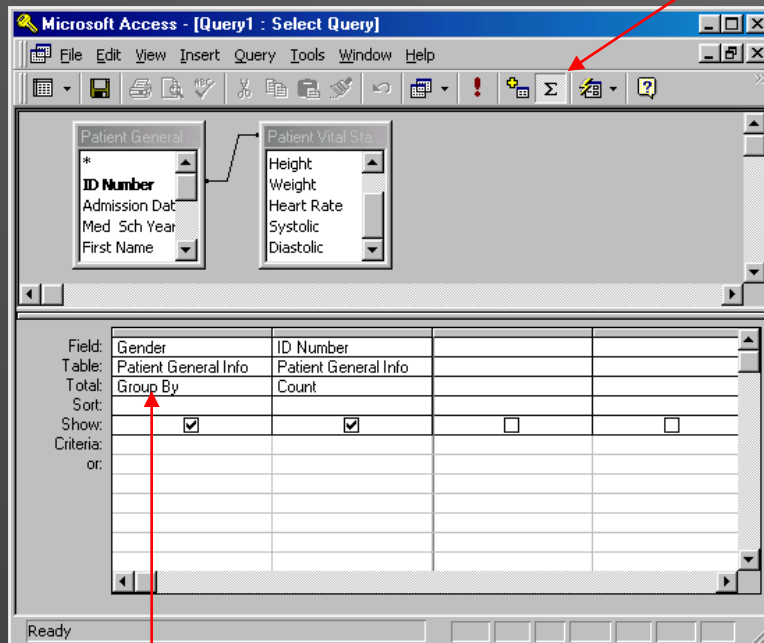
You need not "show" the data field to use as a filter.

Query – Filter Operators

=	equals
>	greater than
>=	greater than or equal
<	less than
<=	less than or equal
≠	not equal to
Between	between two values
Is Null	field is empty
is not null	field is not empty
Like	Matches a pattern (Like John*)
OR	Logical OR (one or other is true)
AND	Logical AND (both are true)
etc.	

Query – Grouping Data – 1

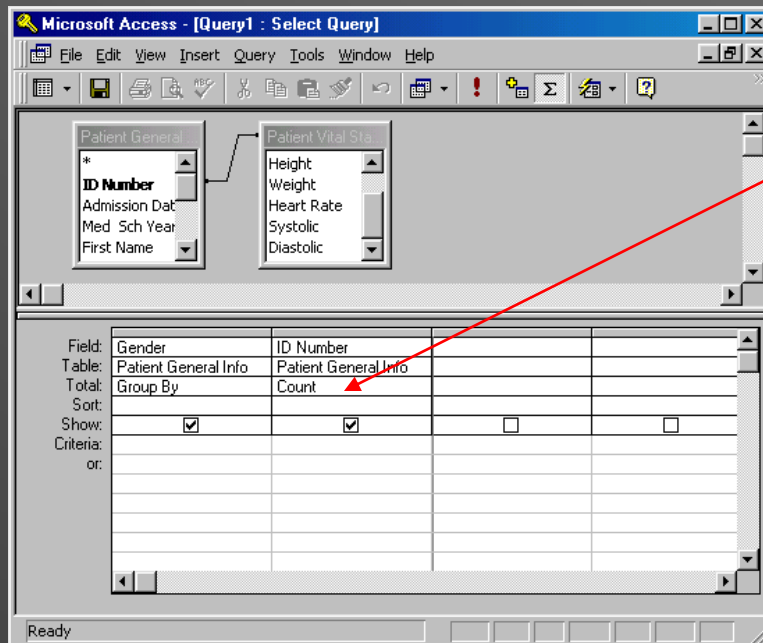
Clicking the Totals Button Enables Grouping, Counting and Statistical Options



Running this Query indicates there are 203 Females and 261 Males in the database.

Notice new “Total” row.
Each field (column) can be set.

Query – Grouping Data –2



Totals Options Include:

Group By

Sum

Avg

Min

Max

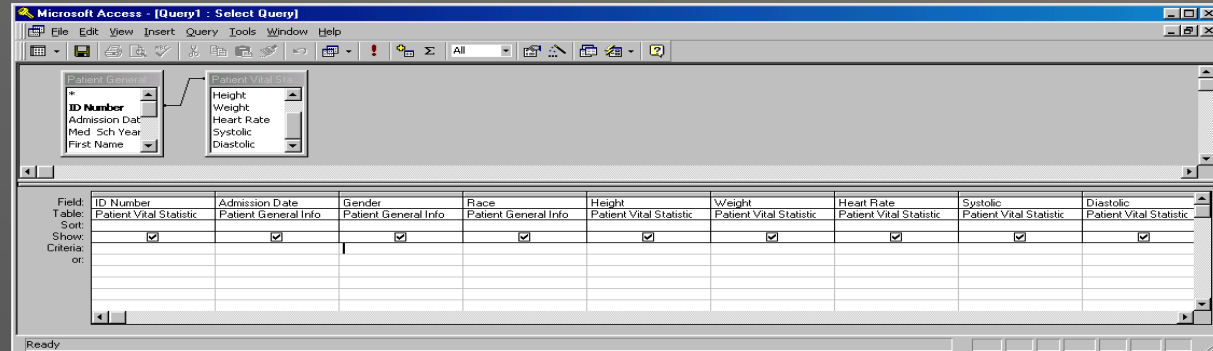
Count

StDev

Var

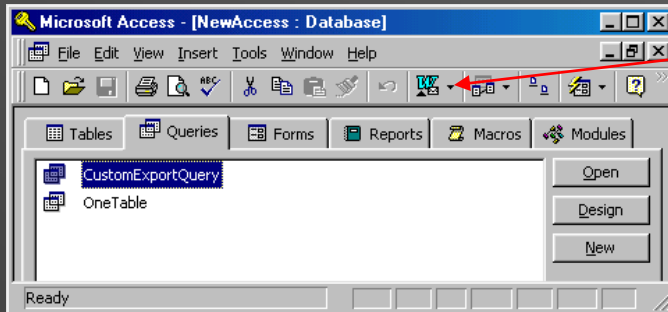
Query – Export Data

1) Create and Save Query

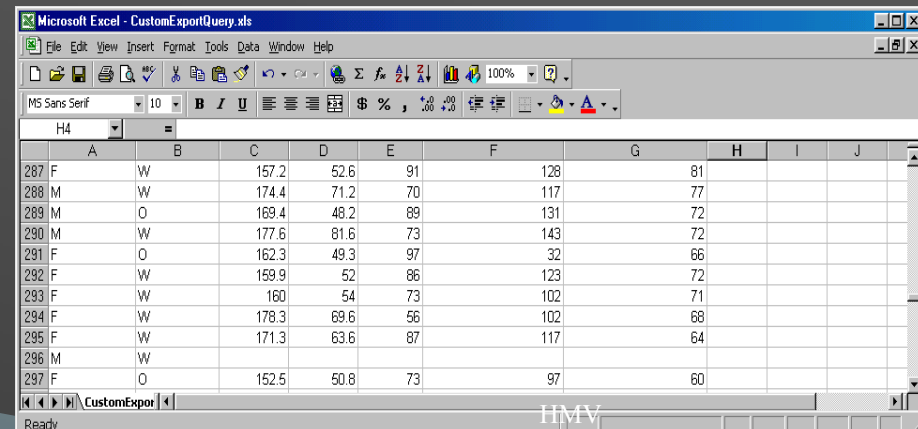


2)

Use OfficeLinks (Excel Toggle Option) to “Analyze it with Excel”



3) Data Automatically Exported to Excel



MS Access

Queries are extremely easy to set up/use and provide an up-to-date snapshot of your data at any time.

Queries may be used to calculate values based upon existing fields, join fields from separate tables, globally update or delete data, and export linked/calculated data to external programs.

Under the hood, queries are really nothing more than stored SQL statements that are run upon command. They add little mass to the file application.

If you use MS-Access for nothing else, you should learn to import data and become proficient with query functionality.

MS–Access Import/Query Practice

Import data from the sample Excel file “msci_data.xls” into an Access database table. Design and save a new query named to display only the following fields: 1) Case; 2) Sex; 3) BMI_Av (a calculated field computed by averaging BMI_1 and BMI_2). Select filter criteria in the query to show only those records where: 1) age is between 30 and 90; 2) the sex field equals 0; and 3) and the survdays field contains a value between 100 and 300.

Using the imported table from part A, design and save a new query named Question2 to provide summary data for each sex / alive combination (ie we want to see 4 rows of data). For each of these combinations compute: 1) count of case numbers; 2) average of length of stay (LOS); and 3) standard deviation of length of stay (LOS).

Creating / Working with Forms/Reports

Graphical User Interface (GUI)

Although it is possible to enter data directly into a table, you can enhance data quality by forcing data entry through forms.

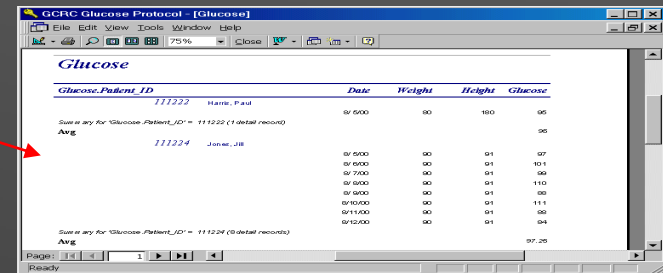
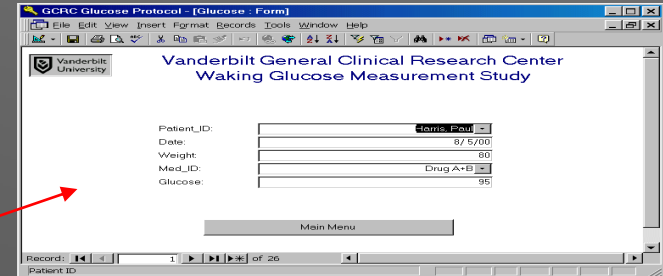
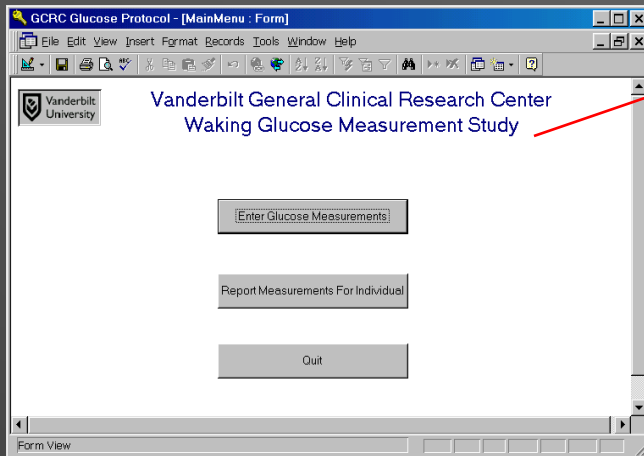
Depending upon your users, you may wish to set things up so they never even see the database window. In other words, you can design your application so they only touch the data through programmed forms.

Graphical User Interface (GUI)

Continuing with the glucose database we formulated earlier, we'll now attempt to build a graphical user interface to:

- 1) Collect Data
- 2) Periodically report data through pre-formatted reports
- 3) Quit the program

GUI - Forms/Report Live



Out of Program

MS Access

Use forms and reports together to build a data software application.

Design to the lowest common denominator (Murphy will use your program early and often)

Always look for and design carrots to win over the true data entry personnel. If it saves them time or offers something they couldn't do before, they might use the application.

Look for champions – bright, energetic individuals who will try something new, etc.

MS Access – Resources

I cannot recommend the BEST MS-Access book. However, I can recommend the following series of books that I usually turn to when learning new technology:

- Visual Quickstart Series – beginner/intermediate level
- O'Reilly Series – intermediate/advanced level

There is also an excellent tutorial on the web:

<http://mis.bus.sfu.ca/tutorials/MSAccess/tutorials.html>