



Microsoft Access -

A Primer for Relational Database Design and Use

Paul A. Harris, Ph.D.
Director, GCRC Informatics

September 30, 2004



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.

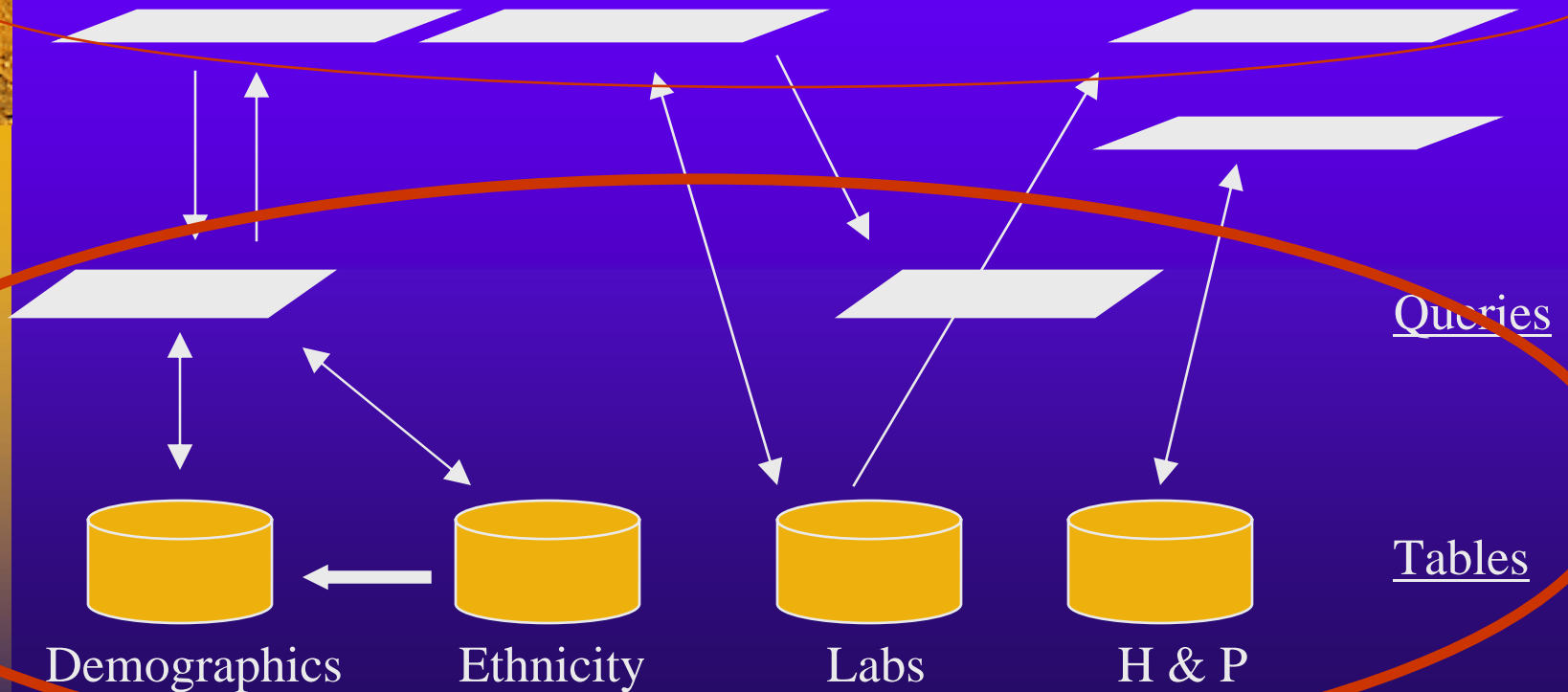
It is easy to export data from MS Access to Excel → SPSS

What is in an MS-Access file?

VB + Macros – Event Driven Automation, etc.

Forms (Active)

Reports (Static)



Front-End Example



Vanderbilt University Medical Center

Autonomic Dysfunction Center
Autonomic Function Tests

Date: Monday, May , 20
Patient:
Unit #:
Gender: Age (yr):

DATE: 3/2 TIME: 1200 TIME LAST MEAL: 0830 Wt (kg):
Medications:

		Blood Pressure	Heart Rate
1. Orthostatic:			
Standing Time 300 sec.	Supine	184 / 110	76
	Sitting	149 / 80	88
	Standing	90 / 60	94
2. Sinus Arrhythmia: (best of 8 attempts)			
HR max-min:	18 (Normal > 8)	Max HR	93
SA ratio:	1.24 (Normal > 1.2)	Min HR	75
3. Valsalva Manuever: (best of 3 attempts)			
Pressure reached	10 mmHg	Baseline	/
		Phase II	/
		Phase IV	/
<i>(Blood pressure should fall < 20 mmHg during phase II and should increase > 10 mmHg during phase IV)</i>			
Valsalva ratio:	(HR II / HR IV, normal > 1.4)		
4. Hyperventilation: (Blood pressure should fall < 10 mmHg)			
	Baseline	175 / 105	75
	30 sec	120 / 75	100
5. Handgrip: (30% of maximal voluntary contraction) (SBP should increase > 15 mmHg)			
	Baseline	156 / 110	69
	1 min	144 / 100	74
	2 min	148 / 110	74
	3 min	162 / 110	80
5. Cold Pressor Test: (SBP should increase > 20 mmHg)			
	Baseline	170 / 100	75
	1 min	180 / 110	106

DataEntry : Form

ADC Database - AFT AFT Data Entry Form

Search By Name:

Search By VUH#:

VUH#:

General Orthostatic / Sinus Arrhythmia Valsalva / Hyperventilation Handgrip / Cold Pressor Comments

	Blood Pressure	Heart Rate
Baseline	150 / 75	65
Phase II	95 / 65	73
Phase IV	140 / 65	70
Baseline	160 / 90	70
30 sec	135 / 60	60

Print AFT Report Main Menu

5 of 1043



Working with Data

We could spend several days discussing proper table design and other important issues. We could also spend several weeks discussing application development (Forms, Reports, etc).

Today, we'll be looking at a small, but powerful component of Access today. Using Query objects (or stored procedures) to filter, calculate new variables, and repackage existing data.



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.

Microsoft Access

NewAccess : Database

Query1 : Select Query

Patient General Information

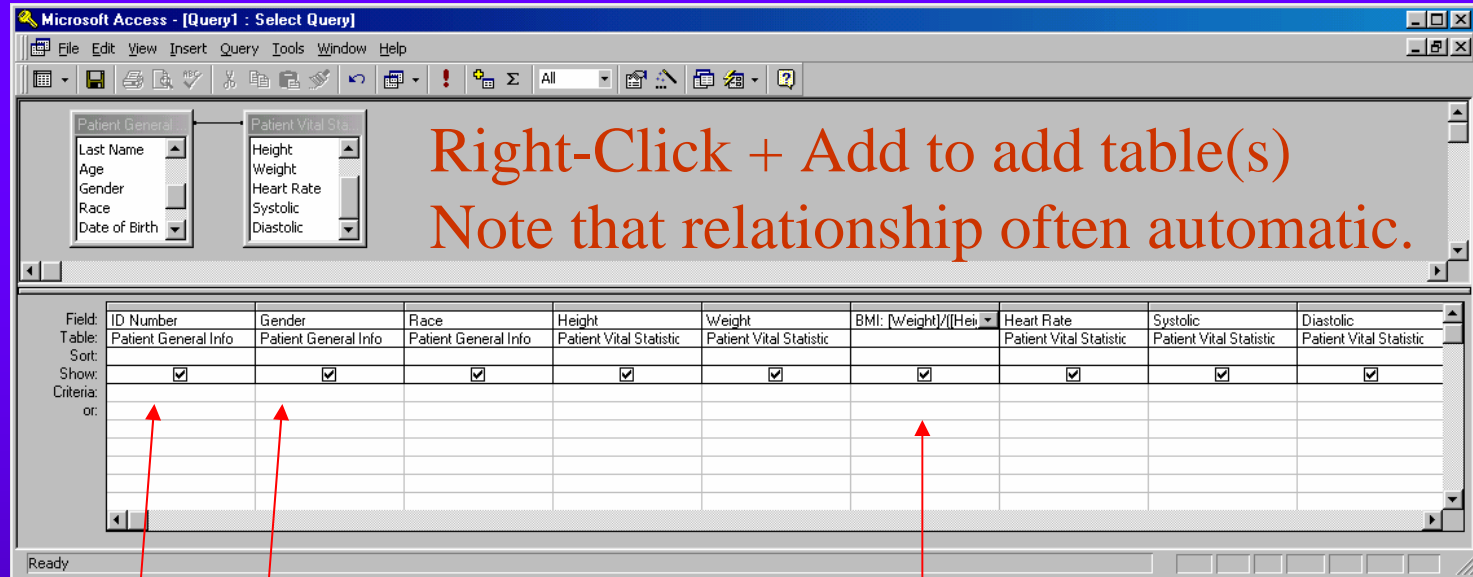
Field:	ID Number	Admission Date	Gender	Date of Birth	
Table:	Patient General Info	Patient General Info	Patient General Info	Patient General Info	
Sort:	Ascending				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>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

Ready

Right-Click + Add to add table(s)

Drag and Drop Fields

2-Table Query Example - Live



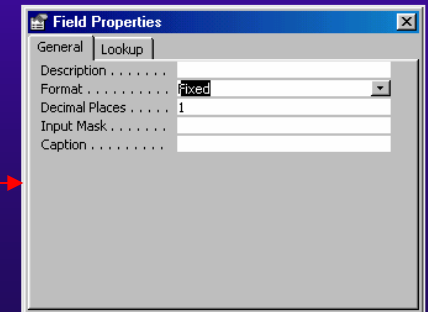
Right-Click + Add to add table(s)
Note that relationship often automatic.

Drag and Drop Fields

Calculated Field

Right-Clicking gray area
above field enables
property changes.

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



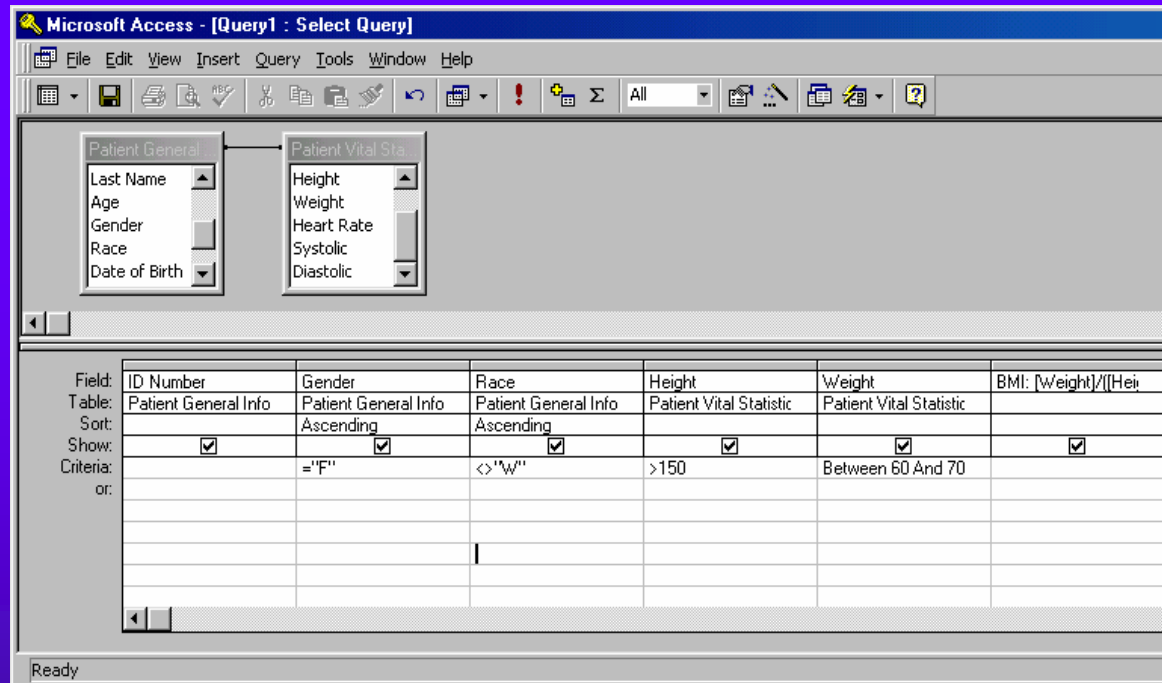


Query – Calculating Fields

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 – 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.

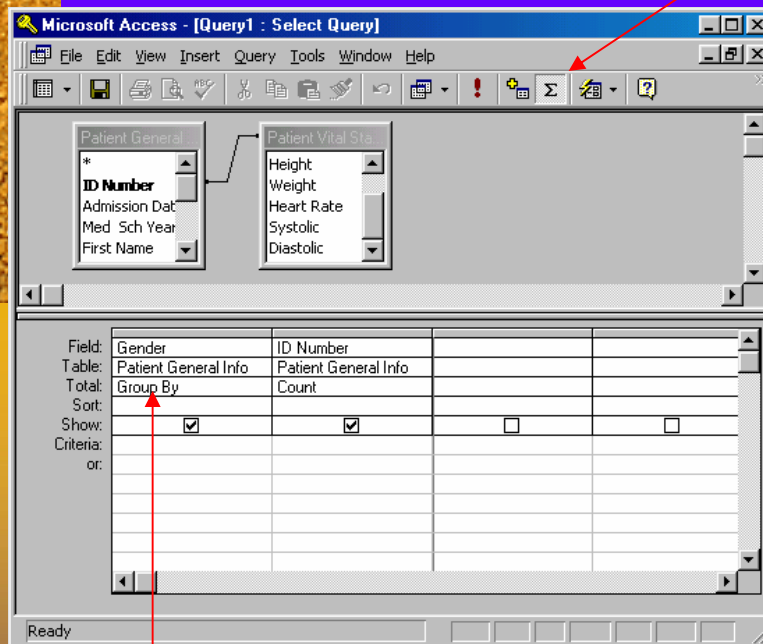


Query – Filter Operators

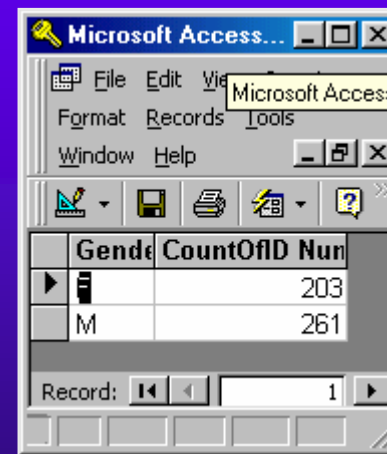
=	equals
>	greater than
>=	greater than or equal
<	less than
<=	less than or equal
<>	not equal to
Between	between two values
Is Null	field is empty
is not null	field is not empty
Like	Matches a pattern (Like John*)
OR	Logical OR (one or other is true)
AND	Logical AND (both are true)
etc.	

Query – Grouping Data - 1

Clicking the Totals Button
Enables Grouping, Counting
and Statistical Options

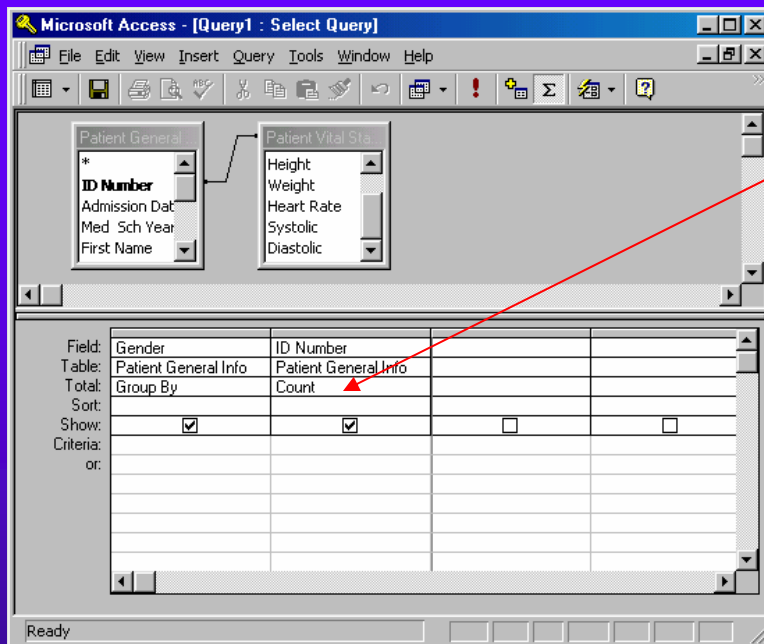


Notice new “Total” row.
Each field (column) can be set.



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

Query – Grouping Data -2



Totals Options Include:

Group By

Sum

Avg

Min

Max

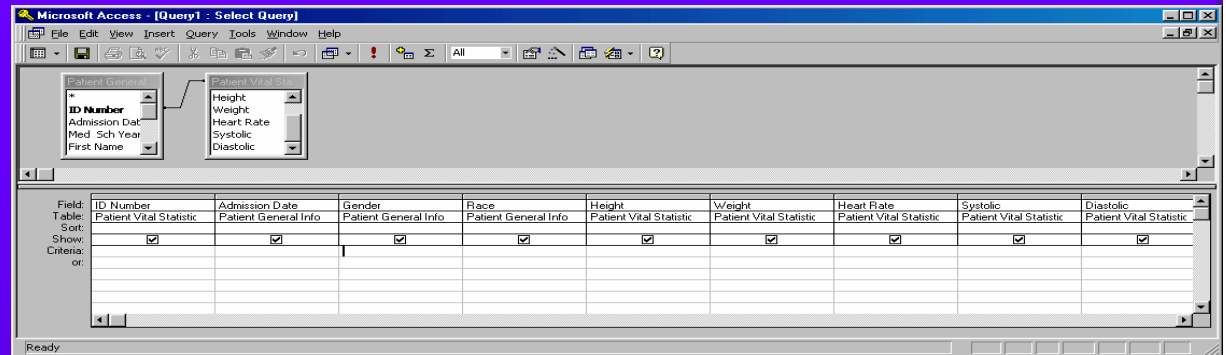
Count

StDev

Var

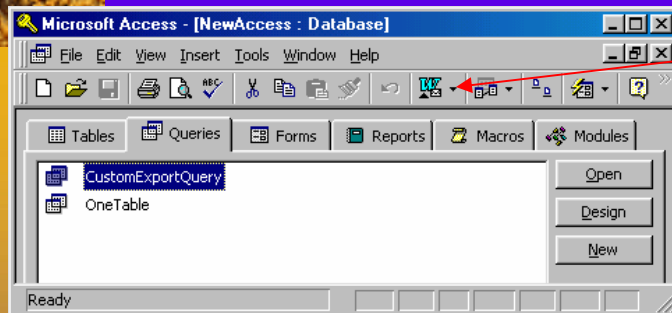
Query – Export Data

1) Create and Save Query



2)

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



3) Data Automatically Exported to Excel

The screenshot shows the Microsoft Excel spreadsheet with the data exported from the Access query. The data is as follows:

	A	B	C	D	E	F	G	H	I	J
287	F	W	157.2	52.6	91	126	81			
288	M	W	174.4	71.2	70	117	77			
289	M	O	169.4	48.2	89	131	72			
290	M	W	177.6	81.6	73	143	72			
291	F	O	162.3	49.3	97	32	66			
292	F	W	159.9	52	86	123	72			
293	F	W	160	54	73	102	71			
294	F	W	178.3	69.6	56	102	68			
295	F	W	171.3	63.6	87	117	64			
296	M	W								
297	F	O	152.5	50.8	73	97	60			



MS Access – Queries Summary

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 – Resources

GCRC Summer Workshop

www.mc.vanderbilt.edu/gcrc/access/

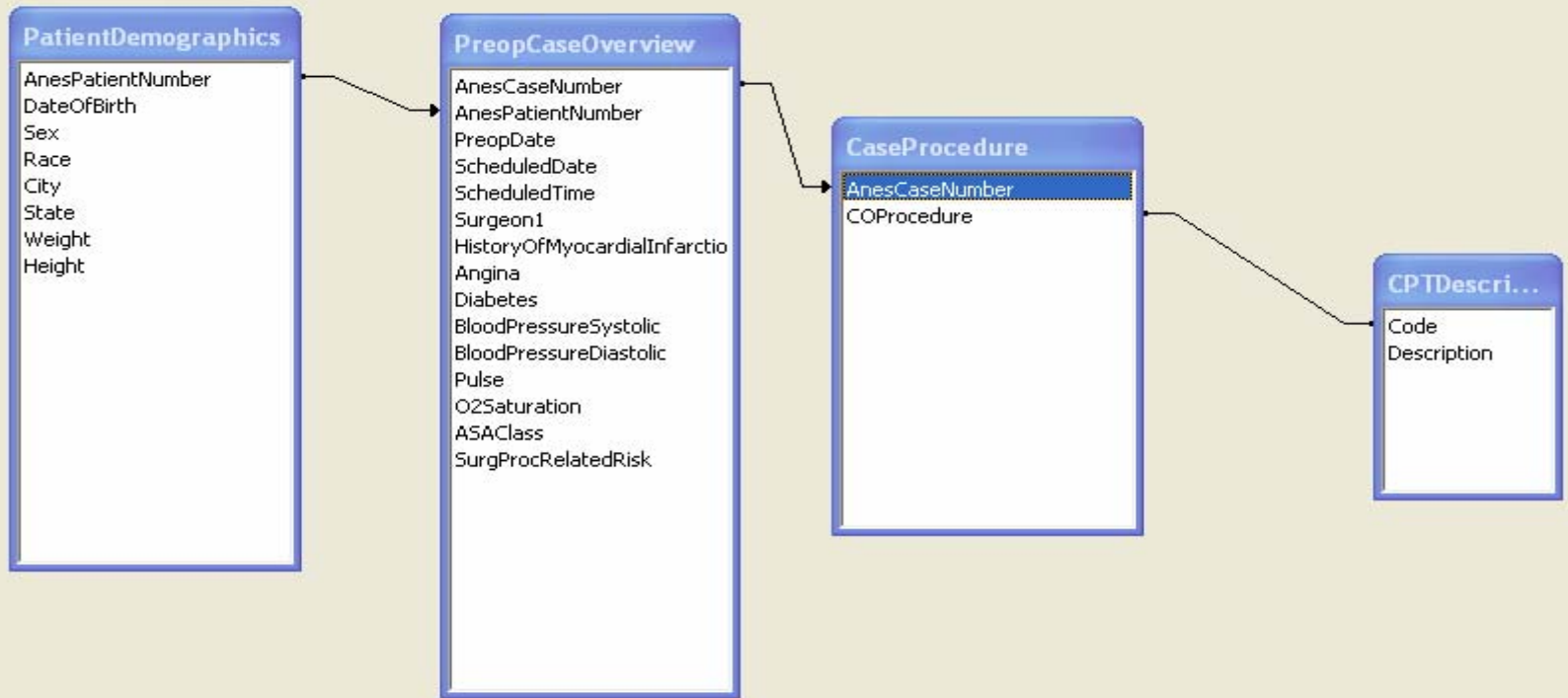
I cannot recommend the BEST MS-Access book. However, I can recommend the following series of books that I usually turn to when learning new technology:

- 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>

Homework Hints:



Query Calculation Syntax

ApproxAge: $\text{ROUND}(\#6/1/99\# - [\text{DateOfBirth}] / 365.25, 0)$

OR

Age: $\text{ROUND}(\text{Iif}(\text{IsNull}([\text{PreopDate}]), ([\text{ScheduledDate}] - [\text{DateOfBirth}] / 365.25, ([\text{PreopDate}] - [\text{DateOfBirth}] / 365.25), 0)$