

Two Topics: Queries & Universality



Once database tables are built, the easiest way to perform most subsequent processing is by deriving new tables using database queries. Project 4 illustrates this technique.

Universality is a key property of computers that explains their success and implies future potential.

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Universality

- ❖ Universality means in broad terms “anything one computer can do, any computer can do”
- ❖ Universality says computers are all equivalent
 - + A new computer doesn't do *more* than the computer it replaces, it just does it faster
 - + Though there have been many generations of computers, none have been “more powerful” than the very first computers, in the sense of being able to solve more problems or compute more things
 - + *Universality is true because the instruction set of one computer -- the computer's basic operations implemented in hardware -- can be simulated by the instruction set of any other computer, enabling it to do whatever the original machine could do*

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Processing Information

- ❖ Universality is one way in which processing information is different that “processing matter”
- ❖ A “matter processing” example ...
 - Consider a grinder, say for grinding coffee ... it basically only grinds coffee or perhaps a few other similar size “beans”
 - ... it doesn’t grind tree branches into compost
 - ... it doesn’t grind steel to sharpen knives
 - ... it doesn’t mix concrete
 - despite the fact these are essentially equivalent physical motions of a rotating appliance on a spindle
- ❖ A computer can add new capabilities simply by adding new software

Practical Considerations ...

- ❖ It often seems like computers are *not* universal ...
 - The computer embedded in the carburetor of a car is not universal, since it only mixes fuel ...
 - ... but this is simply a universal device specialized
 - A cash machine can print receipts but not term papers ...
 - ... but only because it doesn’t have the right printer
 - My Macintosh can’t run my PC programs and my PC can’t run my Macintosh programs ...
 - ... software is distributed in “binary” form a specific instruction set encoding for a specific computer, but Macs and PCs can simulate the other machine, albeit at some loss in speed

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Implications Of Universality ...

- ❖ Physical machines can have perfectly specialized user interfaces since the application range is limited
- ❖ A computer, being a universal device, is “configured” by the user, i.e. the user is involved in making the capability available and matching the software’s behavior to his or her needs

... consider the time spent with computers setting defaults and properties, and in orchestrating a computation by invoking (double clicking on) applications, naming files, moving files, locating files, ...

- ❖ It gets easier, but it will never go away or be trivial

Most people don’t know how cars work but they can drive and fully use a car.
Why learn how computers work ...?

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Queries

- ❖ A query is a statement (in a language like SQL) to define a table by extracting information from existing tables
- ❖ An example ...

```
SELECT Visit.Date, Visit.Tracking, Visit.HepBO
FROM Visit
WHERE ((Visit.Tracking)<>"") AND ((Visit.HepBR)=Yes);
```

- ❖ Once the basic tables of a database are set up, the remaining processing is usually derived using queries

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- ❖ The CDC retains its data in the three basic tables, **Clients** , **Doctors** and **Visit**
- ❖ Other tables are needed for information system operation
 - + Lab Manifests are derived from the **visit** table
 - + Labels are derived from the Lab Manifest tables
 - + A table is needed as input to the letter creation operation, which is built from the **visit** and the **Clients** tables
 - + A table of summary statistics must be created from **visit** records

- ❖ Queries are written in a “query language” ... SQL has become the most popular, though others exist
- ❖ Writing queries is easily learned (easier than VB6.0!)
- ❖ Basic components of a query ...

The SELECT clause specifies the fields in the resulting table

SELECT Visit.Date, Visit.Tracking, Visit.HepBO

FROM Visit

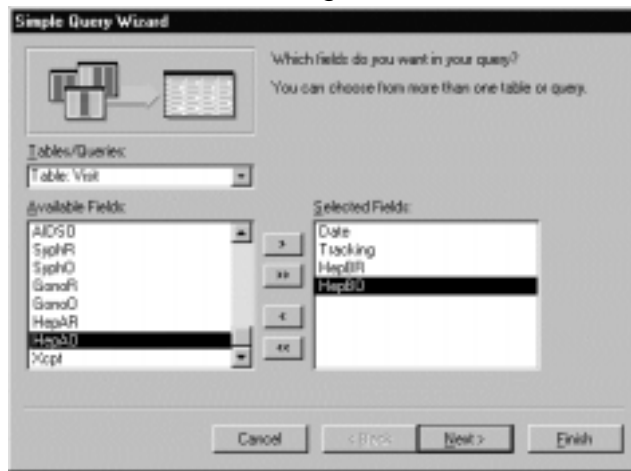
The FROM clause specifies which tables are involved in the query, including tables that are JOINed together

WHERE ((Visit.Tracking)<>"") AND ((Visit.HepBR)=Yes));

The WHERE clause imposes constraints on the fields allowing specific types of information to be extracted

Using A Wizard For Lab Manifest

- ❖ A manifest must be generated for each test from Visit



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Restricting The Query

- ❖ Constraints are needed because selecting out the fields includes more records than desired

	Date	Tracking	HepBR	HepBO
	5/24/99	CDC4C4B45	<input type="checkbox"/>	
	5/28/99	CDC4C4B46	<input checked="" type="checkbox"/>	
	5/28/99		<input type="checkbox"/>	
	5/28/99	CDC4C4B49	<input checked="" type="checkbox"/>	
*	5/28/99		<input type="checkbox"/>	

- + Test not selected
- + Test not ordered
- + Test for earlier date

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Adding Criteria

- ❖ The query can be edited to add restrictions

LabManHepB : Select Query

Visit

*
VisitID
ClientID
DoctorID
Tracking

Field:	Date	Tracking	HepBO	HepBR
Table:	Visit	Visit	Visit	Visit
Sort:				
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:	Date()	<>" "		Yes
or:				

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Resulting Query

- ❖ The query to select out all of the tests that were ordered today for Hepatitis B is

```
SELECT Visit.Date, Visit.Tracking, Visit.HepBO
FROM Visit
WHERE (((Visit.Date)=Date())
      AND ((Visit.Tracking)<>" ")
      AND ((Visit.HepBR)=Yes));
```

LabManHepB : Select Query

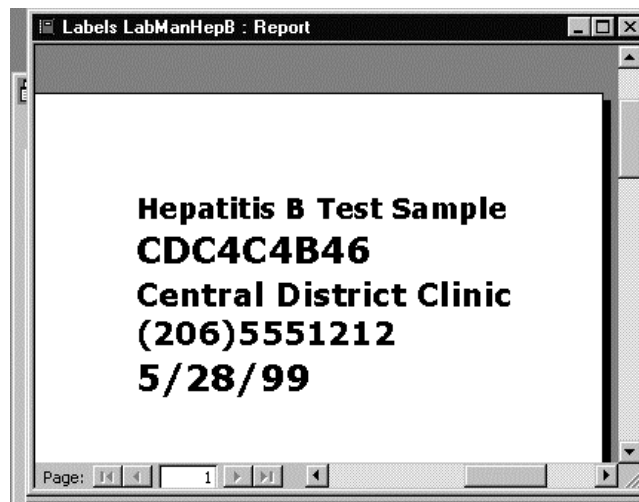
	Date	Tracking	HepBO
	5/28/99	CDC4C4B46	0
	5/28/99	CDC4C4B49	0
*	5/28/99		0

The Report Wizard can help construct the printed manifest

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LabManHepB

Date	Tracking	HepBO
5/28/99	CDC4C4B46	0
5/28/99	CDC4C4B49	0

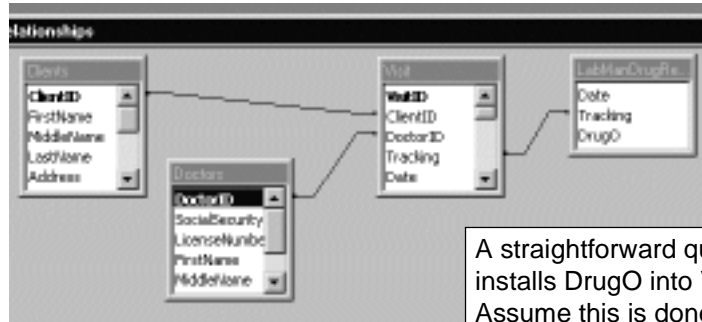


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An Example ... The Drug Test

❖ Incorporating the new results from the Drug test back into Visit works as follows ...

+ There are two tables, Visit and LabManHepB



+ Associating Tracking fields allows tables to be joined