Analysis of the Central District Clinic

CSE 100

Project 4 will require the creation of a database system to support the operation of a fictitious health clinic in downtown Seattle … by studying how an organization functions it is possible to understand how it can be most effectively supported with IT

FIT 100 The Central District Clinic

❖ The Central District Clinic (CDC) is a fictitious walk-in health clinic offering lab tests for drugs, HIV, AIDS, and other diseases

❖ It is staffed by volunteer health professionals and a volunteer receptionist … no need to be concerned with the database issues of billing or payroll

❖ The lab testing is not performed on-site, but is contracted with Seattle labs and hospitals

❖ The goal of our effort is to provide all the database facilities needed to support all aspects of the client processing and testing

> Databases and business systems are best developed by considering how an organization operates

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FIT 100 Consider The Operation Of The CDC

❖ Starting with a client entering …
- The receptionist gathers contact information from the client and enters on the client record; if a client has visited before the data is verified
- The receptionist queues the client to see one of the health professionals working that day
- (After waiting long enough to read last year's *STD Weekly*) the client sees the health professional who fills out a chart with a brief medical history and orders the tests to be run
- The client's specimens are labeled
- At the end of the day the specimens for each test are grouped and compared against a manifest listing all of the tests of that type ordered that day and sent out

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FIT 100 Operation (Continued)

- The results are returned and recorded in each client's record
  + The outcomes are: positive, negative, failed or inconclusive, and exceptional
- A letter is composed to be sent to the client reporting the result of the test(s)
- A mailing label is affixed to the envelope, the letter is verified and it is mailed to the client
- Quarterly, summary statistics are compiled reporting on the clinic's activities including the number of clients and statistics on the number of positive cases of different diseases
- The past quarter's records are archived

FIT 100 Needs Analysis

❖ Review the operation of the clinic to determine what tasks need to be supported by the database system … use the verbs as short hand
- Enter client data
- Queue client for health professional
- Fill out chart
- Order tests
- Label Specimens
- Specimens compared to manifest
- Results recorded in client record
- Reply letter composed
- Quarterly statistics compiled
- Records archived

FIT 100 Enter Client Data

❖ Need a table and form for capturing client data

Client ID	Prefix	First Name	Middle Name	Last Name	Suffix
1	Mr	Thomas	Wright	Jones	Jr.
2	Ms	Emily	Bronte	Smith	

Address	City	State	ZIP	Home Phone	Work Phone	Birthdate
123 1st Avenue	Seattle	WA	98100	(206) 555-1212		11/22/33
333 Columbia S	Seattle	WA	98000	(425) 543-1000	( ) 543-3333	12/12/50

CDC

	Client ID: 1
	Prefix: Mr
	First Name: Thomas
	Middle Name: Wright
Date: 11/20/99	Last Name: Jones Jr.
Birthdate: 11/22/33	

Address: 123 1st Avenue
City: Seattle   State: WA   Zip Code: 98100
Home Phone: (206) 555-1212
Work Phone: ( ) ___ - ____

FIT 100 — Queue Client With Med Professional

- ❖ The reference to medical professional implies that the volunteers at the clinic should be recorded … what data should be saved?
  - ❑ Contact Information
  - ❑ Medical license information
  - ❑ Home office or hospital
- ❖ Define a table and a form for capturing the data

FIT 100 — Further Attention To Queuing

- ❖ What does queuing really mean?
  - ❑ Associating a client with the medical professional that will see him or her
  - ❑ Such associations are phenomena that can and should be recorded in a database … the phenomenon is a client "seeing" a medical professional, which is called a Visit
  - ❑ What is the relevant Visit data?
    - ✦ Client, but only the key is needed
    - ✦ Medical Professional, key only
    - ✦ Date of visit

| Visit | Date |

| Client | MedPro |
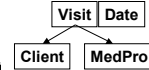
Visits : Table

Field Name	Data Type	
VisitID	AutoNumber	Automatically generated key
MedProID	Number	Field for MedPro key
ClientID	Number	Field for Clients key
Date	Date/Time	Date of visit; default is current day

FIT 100 — A Fundamental Idea

- ❖ Notice that the database design contains tables for "things" such as the Clients table and the table for the medical professional's information
- ❖ These tables represent information about entities
- ❖ The Visits table is different in an important way …
- ❖ It represents information about a relationship between entities, namely that the Client and the MedPro are connected or associated by a visit
  - ❑ Pairing the keys of the related entities is the mechanism
- ❖ The relational database model (that's the set of concepts on which modern databases like Access are built) represents information about entities and relationships

FIT 100 — Fill Out Chart

- ❖ During the visit the medical professional will ask the client questions and discover information … where will this information be recorded?
- ❖ Visits -- it represents the event of the client seeing the medical professional, making it a logical location
- ❖ What information will be gathered …
  - ❑ History -- what is the relevant past medical data?
  - ❑ Symptoms -- what's wrong now?
  - ❑ Notes -- observations about the patient, comments
  - ❑ Tests requested

FIT 100 — Order Tests

- ❖ Ordering tests can be thought of as the final action of a visit by a client to a medical professional
- ❖ What activities are created by ordering a test
  - ❑ Collecting specimens … not an IT task
  - ❑ Labeling specimens
- ❖ The label must …
  - ❑ Uniquely identify the patient, but respect privacy
  - ❑ Must specify the test to be run
  - ❑ Must identify the CDC

Creating the tracking number is a task initiated by Ordering

Central District Clinic
123 Yesler Way
Seattle WA 98100
Hep B: CDC09A00BD0

| Test | Tracking Number |

FIT 100 — Compare To Manifest

- ❖ A manifest is a list of things that are supposed to be in a package
- ❖ When the specimens are sent to the lab at the end of the day, there must be a separate list of all the specimens collected for each test …
  - ❑ What information is on the list?
  - ❑ How is this information created?
- ❖ A manifest for a given day for a given test can be created by selecting all those records that have the proper date and have that test checked … derive a new table

FIT 100 CDC Database Design -- Summary

- ❖ The three primary tables have been formulated: Clients, MedPros and Visits
- ❖ The concept of representing entities and relationships in tables has been introduced

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FIT 100 Recall The CDC Operation

- ❖ At the CDC there are various operations, some performed on a per/client cycle, others performed at larger intervals
  - ❑ Enter client data
  - ❑ Queue client for health professional
  - ❑ Fill out chart
  - ❑ Order tests
  - ❑ Label Specimens
  - ❑ Specimens compared to manifest
  - ❑ Results recorded in client record
  - ❑ Reply letter composed
  - ❑ Quarterly statistics compiled
  - ❑ Records archived

FIT 100 The Problem of Queuing

- ❖ When the receptionist finishes filling out the Clients form, the client is queued for the medical professional
- ❖ What does it mean in database terms to "queue" someone? [This isn't a standard idea, its just something that we need to invent for this project.]
- ❖ Recall that queuing established the relationship between a client and a medical professional … we represent one of these relationships by a row in the Visits table, so ...

> Queuing must involve creating a row in the Visits table with the initial data of a client and a med pro

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FIT 100 Construct A Client's Form To Queue

- ❖ Once the data is entered on the Client form, the receptionist must choose a medical professional

> A "linked form" is a way to put data into another table

FIT 100 Clicking on Queue ...

- ❖ Clicking on Queue brings up a miniform with 3 fields in it from the Visits table, not from the Clients table

- ❖ Pairing the client and the medical professional creates the relationship we want to represent, so ...

> By entering the medical professional's ID and the Client's ID the receptionist sets up the visit for the client AND sets up the row in Visits to record the data for the visit

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FIT 100 Getting A Linked Form

- ❖ When working in the form wizard follow these steps to get the linked form for the queuing:
  - ❑ Move all of the fields from Clients to the form
  - ❑ Move the three fields from Visits: VisitID, MedProID, ClientID
  - ❑ When queried for how you want the two table's data displayed, say linked form

> Summary: Linked forms allow the receptionist to enter data into two tables: Clients and Visits … and the Visits entries do the queuing

Handling Tests

- ❖ There are two aspects to a test request:
  - ❑ The information that a test is requested
  - ❑ The outcome of the test
- ❖ The two aspects could be handled in a single field, but will be treated separately
  - ❑ For each <test>, there is a <test>R checkbox field for the request
  - ❑ For each <test>, there is a <test>O text field for the outcome
- ❖ On the form, only the request checkboxes are shown

Ordering

- ❖ The final act of a visit is for the medical professional to "order" the tests
- ❖ The action of ordering in the database system is to create the client's tracking number
- ❖ This involves adding a command button control and programming the creation of the tracking number

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The Order Button

- ❖ Like any command button control, the programmer places it on the form and programs the event handler

The difference for Access is that the handler will prepare for different operations ... so select the right option is important

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Computing Tracking Number

- ❖ The "preloaded" command event handler has code:

```
Option Compare Database
Option Explicit

Private Sub cmdOrder_Click()
On Error GoTo Err_cmdOrder_Click
          Tracking number computation here
    DoCmd.DoMenuItem acFormBar, acRecordsMenu, 5, , acMenuVer70

Exit_cmdOrder_Click:
    Exit Sub

Err_cmdOrder_Click:
    MsgBox Err.Description
    Resume Exit_cmdOrder_Click

End Sub
```

Entering Tracking Number

- ❖ The tracking number field is something the user cannot enter (locked field) and cannot change …

```
Tracking.SetFocus
Tracking.Locked = False
Tracking.Text = "CDC" & Hex((12*(Year(Date)-Year("11/20/99"))
                    + Month(Date)) * 1000000 + VisitID)
Tracking.Locked = True
```

- ❖ What is the tracking number in English?
- ❖ It is the letters "CDC" followed by the computer's hexadecimal encoding of the number of months since the creation of this program followed by the VisitID

The tracking number is reversible, but not easily associated with a person or a visit

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The Results ...

- ❖ Click on Order to create tracking number

Form Commands

- ❖ Other activities of the CDC database system can make use of form command buttons

  - ❑ Clear -- it is possible to remove all of the text on a form before it goes into the database … this would be advantageous in case the receptionist goofs up badly or someone just gets up and walks out

  - ❑ Print Labels -- it is possible to print out the specimen labels on command from the Visits form

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Summary

- ❖ A series of critical operations for the clinic database
  - ❑ Queuing … setting up the relationship in Visits
  - ❑ Handling tests
  - ❑ Ordering tests
  - ❑ Developing the tracking number
  - ❑ More command buttons

Recall The CDC Design ...

- ❖ As it exists so far, the CDC database system has the following components:
  - ❑ Clients Table and Clients Form with Queue mechanism
  - ❑ MedPros Table and MedPros Form
  - ❑ Visits Table and Visits Form with Order button to set the tracking number
- ❖ What remains is to prepare for the "post visit" processing
- ❖ The main idea in "post visit" processing is to build new tables from the data in the Visits table
- ❖ These derived tables are produced by *queries*

Queries

- ❖ Queries are commands to the database system describing how to construct a (new) table from existing tables

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A Query

SELECT Visits.Date, Visits.TrackingNum, Visits.DrugR, Visits.HIVR, Visits.AIDSR, Visits.HepatitisBR, Visits.ExceptR

FROM Visits;

Queries can be written directly or the Wizard will help create simple queries

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Queries Do More Than Save Columns

- ❖ Records with specific properties can be selected

For example: Keeping those entries with tracking numbers can be accomplished by testing that the field is not equal to "nothing"; saving only those entries that have the drug test request checked can be accomplished by testing it for "Yes"

Specifying The Criteria For Testing

❖ Beginning with the basic query that selects the proper columns, enter Design view and edit the Criteria

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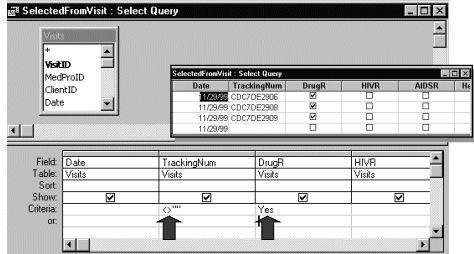
Changes To The Query Are Visible

SELECT Visits.Date, Visits.TrackingNum, Visits.DrugR, Visits.HIVR, Visits.AIDSR, Visits.HepatitisBR, Visits.ExceptR
FROM Visits
WHERE (((Visits.TrackingNum)<>"") AND ((Visits.DrugR)=Yes));

These queries are expressed in a common database query language, SQL … to see the SQL, select the SQL View under the View menu

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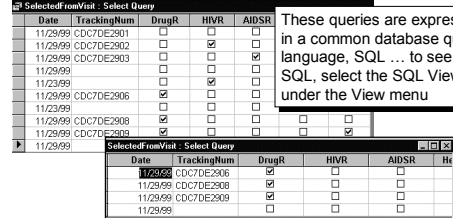
Another Example

❖ Create a table with tracking numbers for those requesting a drug test together with their first names … first construct the basic table

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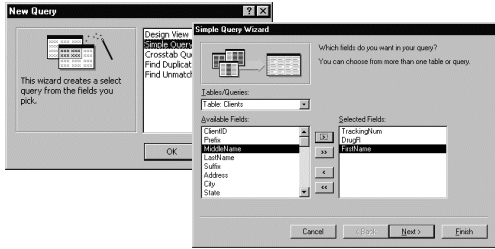
The Basic Query

❖ Columns have been selected from two base tables

Visits Table   Clients Table
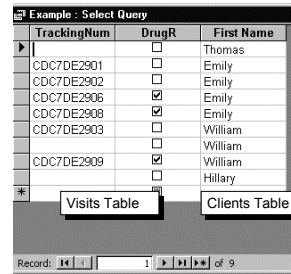
Finishing Query With Selections

❖ … Then limit selections to nonempty tracking numbers and Drug test requests

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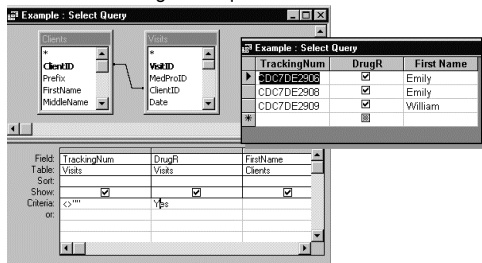
Joining Tables Together

SELECT DISTINCTROW Visits.TrackingNum, Visits.DrugR, Clients.FirstName
FROM Clients INNER JOIN Visits ON Clients.ClientID = Visits.ClientID
WHERE (((Visits.TrackingNum)<>"") AND ((Visits.DrugR)=Yes));

Build A Table Summarizing Tests

❖ Today -- a table with tracking numbers for any Client that requested a test
  ❑ Fields come from Visits
    ✛ Tracking number
    ✛ Date
    ✛ The request fields from the tests

TodaySource : Select Query

TrackingNum	Date	DrugR	HIVR	AIDSR	HepatitisE	ExceptR
CDC7DE2901	11/29/99	☐	☐	☐	☑	☐
CDC7DE2902	11/29/99	☐	☑	☐	☑	☐
CDC7DE2903	11/29/99	☐	☐	☑	☐	☐
	11/29/99	☐	☐	☐	☐	☐
	11/23/99	☐	☑	☐	☐	☐
CDC7DE2906	11/29/99	☑	☐	☐	☐	☐
	11/23/99	☐	☐	☐	☐	☐
CDC7DE2908	11/29/99	☑	☐	☐	☐	☐
CDC7DE2909	11/29/99	☑	☐	☐	☐	☑
	11/29/99	☐	☐	☐	☐	☐

Must Be More Selective

TodaySource : Select Query

TrackingNum	Date	DrugR	HIVR	AIDSR	HepatitisE	ExceptR
CDC7DE2901	11/29/99	☐	☐	☐	☑	☐
CDC7DE2902	11/29/99	☐	☑	☐	☑	☐
CDC7DE2903	11/29/99	☐	☐	☑	☐	☐
	11/29/99	☐	☐	☐	☐	☐
	11/23/99	☐	☑	☐	☐	☐
CDC7DE2906	11/29/99	☑	☐	☐	☐	☐
	11/23/99	☐	☐	☐	☐	☐
CDC7DE2908	11/29/99	☑	☐	☐	☐	☐
CDC7DE2909	11/29/99	☑	☐	☐	☐	☑
	11/29/99	☐	☐	☐	☐	☐

Today : Select Query

TrackingNum	Date	DrugR	HIVR	AIDSR	HepatitisBR	ExceptR
CDC7DE2901	11/29/99	☐	☐	☐	☑	☐
CDC7DE2902	11/29/99	☐	☑	☐	☑	☐
CDC7DE2903	11/29/99	☐	☐	☑	☐	☐
CDC7DE2906	11/29/99	☑	☐	☐	☐	☐
CDC7DE2908	11/29/99	☑	☐	☐	☐	☐
CDC7DE2909	11/29/99	☑	☐	☐	☐	☑
	11/29/99	☐	☐	☐	☐	☐

At The CDC, Form Today's Tests

❖ Save any test requests for nonempty tracking numbers created today

Criteria on same line are ANDed. Criteria on separate lines are ORed

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The SQL For Today

```
SELECT Visits.TrackingNum, Visits.Date, Visits.DrugR,
              Visits.HIVR, Visits.AIDS Visits.HepatitisBR,
              Visits.ExceptR
FROM Visits
WHERE
(((Visits.TrackingNum)<>"") AND ((Visits.Date)=Date()) AND
((Visits.DrugR)=Yes)) OR
(((Visits.TrackingNum)<>"") AND ((Visits.Date)=Date()) AND
((Visits.HIVR)=Yes)) OR
(((Visits.TrackingNum)<>"") AND ((Visits.Date)=Date()) AND
((Visits.AIDSR)=Yes)) OR
(((Visits.TrackingNum)<>"") AND ((Visits.Date)=Date()) AND
((Visits.HepatitisBR)=Yes)) OR
(((Visits.TrackingNum)<>"") AND ((Visits.Date)=Date()) AND
((Visits.ExceptR)=Yes));
```

The Table From The Today Query

❖ Today becomes the base for building other tables

Today : Select Query

TrackingNum	Date	DrugR	HIVR	AIDSR	HepatitisBR	ExceptR
CDC7DE2901	11/29/99	☐	☐	☐	☑	☐
CDC7DE2902	11/29/99	☐	☑	☐	☑	☐
CDC7DE2903	11/29/99	☐	☐	☑	☐	☐
CDC7DE2906	11/29/99	☑	☐	☐	☐	☐
CDC7DE2908	11/29/99	☑	☐	☐	☐	☐
CDC7DE2909	11/29/99	☑	☐	☐	☐	☑
	11/29/99	☐	☐	☐	☐	☐

❖ For example, the Drug Test Manifest table is the date and tracking number for all Drug tests

```
SELECT Today.TrackingNum, Today.Date
FROM Today
WHERE (((Today.DrugR)=Yes));
```

TodayDrug : Select Query

TrackingNum	Date
CDC7DE2906	11/29/9
CDC7DE2908	11/29/9
CDC7DE2909	11/29/99

Making The Manifest

❖ Once the list of Today's Drug tests is created, the tracking numbers can be printed for the manifest

DrugManifest

Date	TrackingNum
11/29/99	
	CDC7DE2906
	CDC7DE2908
	CDC7DE2909

Simply use the Report Wizard to print the TodaysDrug table ... sort by tracking number

FIT 100 Wrapping Up Today

- ❖ There should be a table built from Today for each test and a manifest for each created in exactly the same way
- ❖ Labels can be printed from the same test tables
- ❖ Use the Report Wizard for labels to create the right form

CDC7DE2906::11/29/99	CDC7DE2908::11/29/99
DRUG::DRUG::DRUG	DRUG::DRUG::DRUG
Central District Clinic	Central District Clinic
123 Yesler Way, Seattle	123 Yesler Way, Seattle
(206)555 1212	(206)555 1212