Analysis of the Central District Clinic

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.

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.

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

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

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

Enter Client Data

❖ Need a table and form for capturing client data
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

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

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

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

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

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
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

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

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

Construct A Client’s Form To Queue

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

Clicking on Queue ...

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

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 request checkbox field for the request
  - For each test, there is a test outcome 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

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

Computing Tracking Number

- The "preloaded" command event handler has code:

```vba
Option Compare Database
Option Explicit
Private Sub cmdOrder_Click()
On Error GoTo Err_cmdOrder_Click
  DoCmd.DoMenuItem acFormBar, acRecordsMenu, 5, , acMenuVer70
  Exit_cmdOrder_Click:
  Exit Sub
  Err_cmdOrder_Click:
  MsgBox Err.Description
  Resume Exit_cmdOrder_Click
End Sub
```

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 goofed 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

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

A Query

```
FROM Visits;
```

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.

Another Example

- Create a table with tracking numbers for those requesting a drug test together with their first names. First construct the basic table.

Finishing Query With Selections

- Then limit selections to nonempty tracking numbers and Drug test requests.

Changes To The Query Are Visible

- These queries are expressed in a common database query language, SQL. To see the SQL, select the SQL View under the View menu.

The Basic Query

- Columns have been selected from two base tables: Visits Table and Clients Table.

Joining Tables Together

- SELECT DISTINCTVisits.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

<table>
<thead>
<tr>
<th>TrackingNum</th>
<th>Date</th>
<th>Drug</th>
<th>HIVR</th>
<th>AIDS</th>
<th>HepatitisB</th>
<th>Except</th>
</tr>
</thead>
<tbody>
<tr>
<td>DCDC2001</td>
<td>11/29/99</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DCDC2002</td>
<td>11/29/99</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DCDC2003</td>
<td>11/29/99</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DCDC2004</td>
<td>11/29/99</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>DCDC2005</td>
<td>11/29/99</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**Must Be More Selective**

- At The CDC, Form Today's Tests
  - Save any test requests for nonempty tracking numbers created today

**The SQL For Today**

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

**Making The Manifest**

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

<table>
<thead>
<tr>
<th>Date</th>
<th>TrackingNum</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/29/99</td>
<td>CDC12345</td>
</tr>
<tr>
<td>11/29/99</td>
<td>CDC12346</td>
</tr>
<tr>
<td>11/29/99</td>
<td>CDC12347</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Location 1</th>
<th>Location 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Central District Clinic</td>
<td>Central District Clinic</td>
</tr>
<tr>
<td>123 Yester Way, Seattle</td>
<td>123 Yester Way, Seattle</td>
</tr>
<tr>
<td>206688 1212</td>
<td>206688 1212</td>
</tr>
</tbody>
</table>