Managing Data

Part I: Need for Information Management

Managing Information Resources

Why Information Management?
- Data are a strategic resource
- Leads to improved decision-making
- Leads to better coordination of operations
- Promotes organizational flexibility

Components of IRM

- Info planning and modeling
- Organizational Processes
- Technology Assimilation
- Data administration
- Organizational Functions
- Database administration
- DBMS
- Enabling Technology
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Types of Information Management

- Document based (internal and external)
  - form plus content
  - e.g., report, memo
- Record based (internal and external)
  - content only
  - e.g., customer data

Internal Document Based Management

- Responsibility-administrators, WP centers, records management
- Sources-corporate documents, memos, reports, forms
- Technologies-word processors, text retrieval systems

External Document Based Management

- Responsibility-corporate libraries
- Sources-purchased reports, public literature, news services
- Technologies-networks, bibliographic services, environmental scanning

External Record Based Management

- Responsibility-end users, planning, marketing
- Sources-public databases
- Technologies-time share, networks
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Internal Record Based Management

- Responsibility - MIS dept.
- Sources - transaction processing and org. units
- Technologies - DBMS

Part II: Data Base Management Systems (DBMS)

Advantages of DBMS

- Controls data redundancy and inconsistency
- Flexible access to shared data
- Central control of data; e.g., standards, security, accuracy

Management Systems (DBMS)

- Value-added systems for data storage and retrieval
- Assumes that data can be structured into levels
- Requires specification of:
  - Data definition
  - Data manipulation language
  - Data dictionary
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Extracting Information from a DBMS

- Information retrieval is required for decision making and problem solving
- Provide users with operators that “assemble” data into appropriate forms; i.e., reports
  - Query languages; e.g., SQL

Levels of Data

- DATABASE -- all customers
- FILE -- customers in the NE
- RECORD -- one customer; e.g., John Smith 225 Spruce St Phila. PA
- FIELD -- one section of record; e.g., Smith (last name field)
- CHARACTER (BYTE) -- one character in a record; e.g., the letter "S" in ASCII as 011 1010
- BIT -- one part of byte; e.g., "1"

Types of DBMS include:

- Hierarchical
- Network
- Relational

Hierarchical DBMS

- Each element is subordinate to another
- Each data item (child) can have only one parent
- Pointers link data items
Hierarchical DBMS

- Each data item is connected to many others
- Data items may have more than one parent
- Pointers link data items

Network DBMS

- Data is stored in tables
- Each row is a tuple and represents an entity
- Each column represents an attribute of the entity
- Rows and columns can be selected, joined, intersected, united, etc.
- Operations require data redundancy
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Relational DBMS Illustration

<table>
<thead>
<tr>
<th>Part #</th>
<th>Part Description</th>
<th>Unit Price $</th>
<th>Supplier #</th>
</tr>
</thead>
<tbody>
<tr>
<td>137</td>
<td>latch</td>
<td>26</td>
<td>4058</td>
</tr>
<tr>
<td>145</td>
<td>handle</td>
<td>22</td>
<td>2038</td>
</tr>
<tr>
<td>152</td>
<td>compressor</td>
<td>70</td>
<td>1125</td>
</tr>
</tbody>
</table>

"JOIN"

<table>
<thead>
<tr>
<th>Supplier #</th>
<th>Supplier Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>1125</td>
<td>CBM</td>
<td>Gary, IN</td>
</tr>
<tr>
<td>2038</td>
<td>Ace Corp.</td>
<td>Essex, NJ</td>
</tr>
<tr>
<td>4058</td>
<td>Bryant Inc.</td>
<td>Rochester, NY</td>
</tr>
</tbody>
</table>

Result of "Join" using Supplier #

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</tr>
</tbody>
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Object Oriented DBMS

- Data is viewed as an object
- There exist procedures that can perform work on object
- Object can be described in terms of attributes
- Relationship between object and other objects indicated

Object Illustration

Animal

IS A

DOG

has:
- 4 legs
- bushy tail
- white paws
Other Means of Storing Data

- Object Oriented Programming
- Hypermedia
- Virtual Reality

Hypermedia

- Based on association links grounded in content
- Retriever initiated search solution
- World Wide Web is an excellent example
- Hyper Text Mark-up Language is the key
  - ....see web illustration...

Virtual Reality

- Combines the use of 3-D modeling and databases
- Data streams determine size, shape, color, etc. of objects
- Excellent for real-time displays

Trends in DBMS

- Handling spatial data
  - GIS, office data mapping
- Incorporating time as a dimension
  - essential to corporate memory systems
- Handling uncertainty
  - pattern recognition
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Part III: Mgmt Issues and Trends

Who Manages the Data?

- Data administrator
  - Decides what data to collect
  - Policies for storing, validating, sharing, and accessing data
- Database administrator
  - Creates databases
  - Carries out policies

Distributed vs. Centralized DBMS

- Data accumulates "near" the customer
- Access to the data is provided to all users across the organization
- Access to local data is provided via communication lines
- Major problems are updates and provision of local access

Management Challenges

- Inconsistent data definitions
- Control of shared data
- Managing the distribution of data
- Maintaining data quality
Part IV: Exercises

Exercise 1: Data Flow

- Task 1
  - Step 1: Develop a data flow diagram for your business or workgroup
  - Step 2: Create a data dictionary to go with data flow diagram
  - Step 3: Discuss the results with a peer

Language for Mapping Information in Organs.

- Accumulations of data (stocks)
- Flows of data (flows)
- Represented in data flow diagrams

Mapping Language Illustration

- External person or company
- Internal Person or workgroup
- File or DB
- Data flow
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Data Flow Illustration

Customer

Customer Rep.

Sally

V.P. Marketing

V.P. Training

Call Sheet DB

Data Dictionary Illustration

<table>
<thead>
<tr>
<th>No.</th>
<th>Definition</th>
<th>Description</th>
<th>File Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Customer question/answer</td>
<td>etc....</td>
<td>etc....</td>
</tr>
<tr>
<td>2</td>
<td>Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Customer call sheet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Customer data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Question report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Call sheet data</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Query response</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Rep report</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Question report</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Exercise 2: Structuring data in a DB

- Take the sample information and structure it into a:
  - Hierarchical DB
  - Network DB
  - Relational DB
  - Object DB
  - Hypertext DB

Exercise 3: Crazy Al's Appliances

- see handout
end....