Introduction to Database Management

- Reading: Chapters 1 & 2 (read lightly)

Some material from Business Database Systems by Connolly, Begg, and Holowczak

Objectives

- Understand the:
  - Common uses of database systems.
  - Meaning of the term database.
  - Meaning of the term Database Management System (DBMS).
  - Components of the DBMS environment.
  - Typical functions of a DBMS.
  - Advantages/disadvantages of DBMSs

- Build your first DB

Your overall goal for this session is to develop a good intuitive idea of a database
Are We on Track?

- Use your desktop computer to access the ISE305 Web site
  - UserID – your NetID
  - PW – your student ID #

Examples of Database Systems

- Purchases using your credit card
- Your iTunes library
- Your navigation (maps) system
- Your academic record (Solar)
- Your health history (maybe)
- All the records of all mobile phone calls in the past 5 years
- The access history of all users that accessed your company’s Web site
Definitions

• Database - collection of logically related data (and a description of this data)
• DBMS - A software system that enables users to define, create, and maintain the database and that provides controlled access to this database

Database Application/System

• Database Application
  • A computer program that interacts with the database by issuing an appropriate request (typically using SQL statements) to the DBMS
• Database System
  • The collection of database applications that interact with the database along with the DBMS and the database itself.
Functions of a DBMS

- Data storage, retrieval, and update
- Transaction support
- Concurrency control services
- Recovery services
- Authorization services
- Support for data communication
- Integrity services
- Utility services

Tables

<table>
<thead>
<tr>
<th>ID</th>
<th>Product</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pocket knife - Nile</td>
<td>4.50</td>
</tr>
<tr>
<td>2</td>
<td>Compass</td>
<td>10.00</td>
</tr>
<tr>
<td>3</td>
<td>Geo positioning system</td>
<td>500.00</td>
</tr>
<tr>
<td>4</td>
<td>Map measure</td>
<td>4.90</td>
</tr>
</tbody>
</table>

A relational table corresponds to an entity

Each table has a primary key that uniquely defines the corresponding row
Users can be in differing locations.

DB Access

Views

- Allows each user to have his or her own view of the database.
- A view is essentially some subset of the database.
- Benefits include:
  - Provides a level of security
  - Provides a mechanism to customize the appearance of the database
  - Presents a consistent, unchanging picture of the structure of the database, even if the underlying database is changed
DBMS Components

• Hardware
  • Can range from a PC to a network of computers

• Software
  • DBMS, operating system, network software (if necessary) and also the application programs

• Data
  • Used by the organization and a description of this data called the schema

Database Design

• The structure of the database is determined during the database design

• The design process is a translation of an understanding of the application (e.g., written statement) into the design

• Many different designs are possible

• Design rules restrict the number of possible designs
MS Access DBMS

- Intended as a simple way to create and use a DB
  - Limited number of simultaneous users
  - GUI interface
  - Non-standard SQL

- Access DB consists of
  - Database name
  - Collection of tables
  - Collection of fields within each table (think of a table as an entity with properties)
  - Type for each field

Advantages of DBMSs

- Control of data redundancy
- Data consistency
- Sharing of data
- Improved data integrity
- Improved maintenance through data independence.
Disadvantages of DBMSs

- Complexity
- Cost
- Cost of conversion
- Performance
- Higher impact of a failure

DBMS Systems Timeline

- File systems
- Hierarchical
- Network
- Spatial
- Relational
- Object-oriented

Timeline:
- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
Nonprocedural Access

- Query: request for data to answer a question
- Indicate what parts of database to retrieve not the procedural details
- Improve productivity and improve accessibility
- SQL SELECT statement and graphical tools

Your work in the course will use the graphical GUI in MS Access as well as SQL

Graphical Tool

Relational Data Model (RDM)
Did You Achieve the Objectives?

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