

## **Part 2: Using Information Technology**

# **Chapter 5**

## **Database and Content Management**

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# Running Case

- Maria wanted to get information about hotel clients at the 1881 but the software was too expensive to purchase for this purpose
- The hotel reservation and management system was version 2.0 and has less advanced features
- She investigated another system that was built on a relational database with advanced features
- She created an interesting spreadsheets that contained different information
- She was able to combine five spreadsheets into a single database

# Study Questions

1. What is content?
2. How can content be organized?
3. What is the purpose of a database?
4. What does a database contain?
5. What is a DBMS, and what does it do?
6. What is a database application?
7. What is the difference between an enterprise and a personal DBMS?

# What is content?

- Content is related to **intellectual property**
  - a form of creative endeavour that can be protected through a trademark, patent, copyright, industrial design, or integrated circuit topography
- Varies by industry
- Organizations may store data, documents, spreadsheets, presentations, web pages, text from blogs, Twitter, or discussion boards, graphics, video files and video logs, audio files, etc.

# How can content be organized?

- Content management includes
  - management of content data
    - efficient and effective storage and processing of bytes
    - Handled by database management systems (DBMS)
  - presentation of content
    - content management system (CMS)
- Content management challenge
  - processing and storing the right content
  - getting the right content to the right person in the right format at the right time

# What Is the Purpose of a Database?

- A database keeps track of things
- Many professionals use spreadsheets
- Spreadsheets
  - Keep lists of single concepts
- Databases
  - Keep lists that involve multiple themes

# What does a database contain?

- A **database** is a self-describing collection of integrated records
- Hierarchy of data elements
  - Byte is a character of data
  - Bytes are grouped into columns/fields
  - Columns grouped into rows/records
  - Rows are grouped into tables/files

# Student Table (also called a file)

**Figure 5-3**

Student Table (also called a *file*)

Columns, also called *fields*

Student Number	Student Name	HW1	HW2	MidTerm
1325	BAKER, ANDREA	88	100	78
1644	LAU, SWEE	75	90	90
2881	NELSON, STUART	100	90	98
3007	FISCHER, MAYAN	95	100	74
3559	TAM, JEFFREY		100	88
4867	VERBERRA, ADAM	70	90	92
5265	VALDEZ, MARIE	80	90	85
8009	ROGERS, SHELLEY	95	100	98

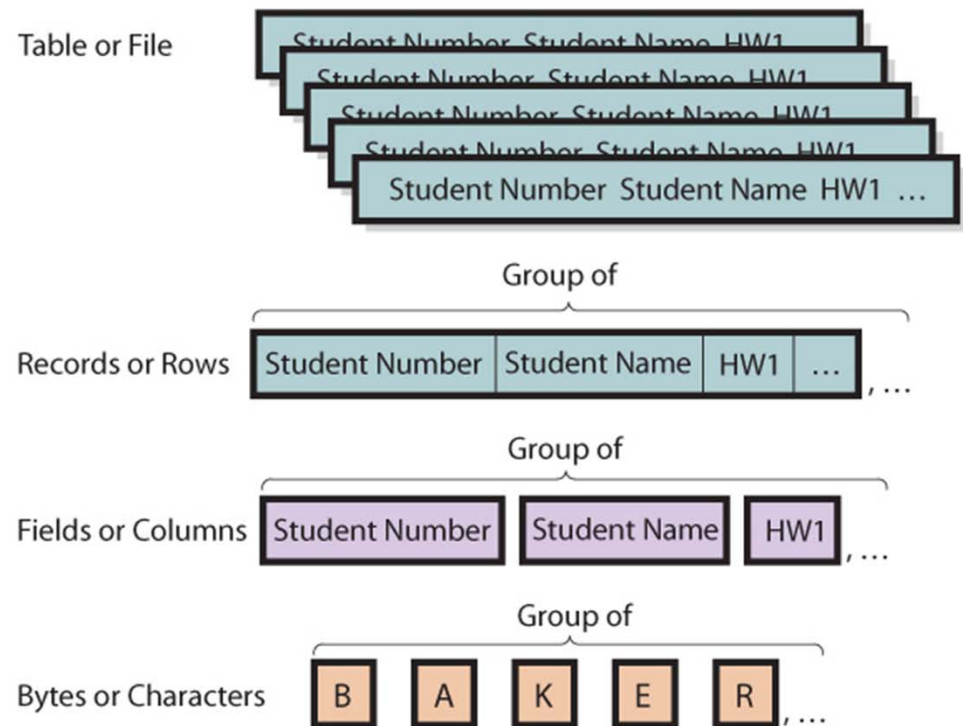
Rows, also called *records*

Characters, also called *bytes*



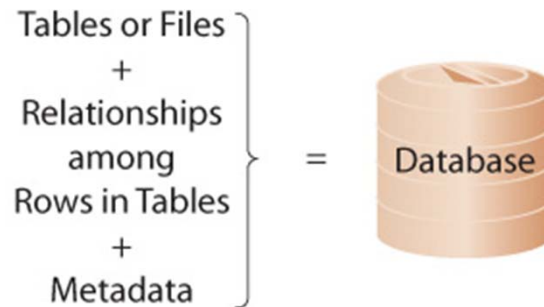
# Hierarchy of Data Elements

**Figure 5-4**  
Hierarchy of Data Elements



# Components of a Database

- Database is a collection of tables *plus* relationships among the rows in those tables *plus* **metadata**
  - describes the structure of the database



**Figure 5-5**

Components of a Database

# Relationships Among Records

- Values in one table may relate to rows in other table(s)
- Keys
  - Column(s) that identify unique row in table
  - Each table has a key
- Foreign keys
  - Keys in a different table than the one in which they reside
- Relational database
  - Databases using tables, keys, and foreign keys

# Example of Relationships among Rows

Email Table

EmailNum	Date	Message	Student Number
1	2/1/2007	For homework 1, do you want us to provide notes on our references?	1325
2	3/15/2007	My group consists of Swee Lau and Stuart Nelson.	1325
3	3/15/2007	Could you please assign me to a group?	1644

Student Table

Student Number	Student Name	HW1	HW2	MidTerm
1325	BAKER, ANDREA	88	100	78
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4867	VERBERRA, ADAM	70	90	92
5265	VALDEZ, MARIE	80	90	85
8009	ROGERS, SHELLY	95	100	98

Office\_Visit Table

VisitID	Date	Notes	Student Number
2	2/13/2007	Andrea had questions about using IS for raising barriers to entry.	1325
3	2/17/2007	Jeffrey is considering an IS major. Wanted to talk about career opportunities.	3559
4	2/17/2007	Will miss class Friday due to job conflict.	4867

Figure 5-6

Example of Relationships among Rows

# Metadata

- Databases are self-describing
  - Collection of integrated records
  - Contains, within itself, a description of its contents
- Metadata
  - Data that describe data
  - Makes databases more useful than spreadsheets
  - Makes databases easier to use

# Example of Metadata (in Access)

**Figure 5-7**

Example of Metadata (in Access)

Field Name	Data Type	Description
EmailNum	AutoNumber	Primary key -- values provided by Access
Date	Date/Time	Date the message is recorded into the database
Message	Memo	Text of the email
Student Number	Number	Foreign key to row in the Student Table

Field Properties

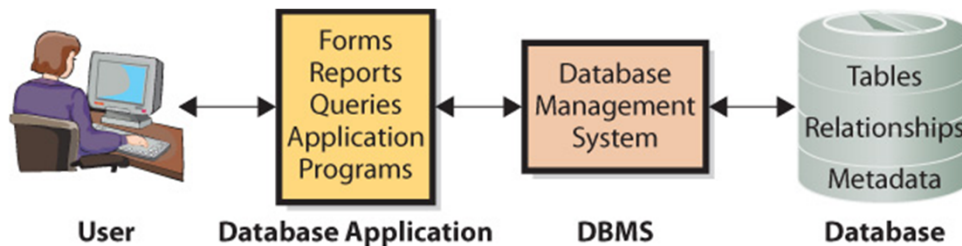
General | Lookup

Format: Short Date  
Input Mask: 99/99/0000;0;#  
Caption:  
Default Value: =Now()  
Validation Rule:  
Validation Text:  
Required: Yes  
Indexed: No  
IME Mode: No Control  
IME Sentence Mode: None

The data type determines the kind of values that users can store in the field. Press F1 for help on data types.

# What is a DBMS, and what does it do?

## ■ Components of a Database Application System



**Figure 5-8**

Components of a Database Application System

# What is a DBMS, and what does it do?

- Database Management System (DBMS)
  - Program that creates, processes, and administers a database
  - Usually licensed from vendors
    - Microsoft, Oracle, IBM, MySQL (open-source)
    - DBMS products – DB2 from IBM, Access and SQL Server from Microsoft, Oracle from Oracle Corporation, MYSQL – an open source DBMS
- DBMS and database are two different things



# A DBMS

- Creating the Database and Its Structures
  - Use the DBMS used to create tables, relationships and other structures in the database
  - Use to define a new table or modify tables
- Processing the Database
  - DBMS processes database
  - Applications use DBMS to *read, insert, modify, or delete* data
  - Structured Query Language (SQL)
    - international standard for processing a database

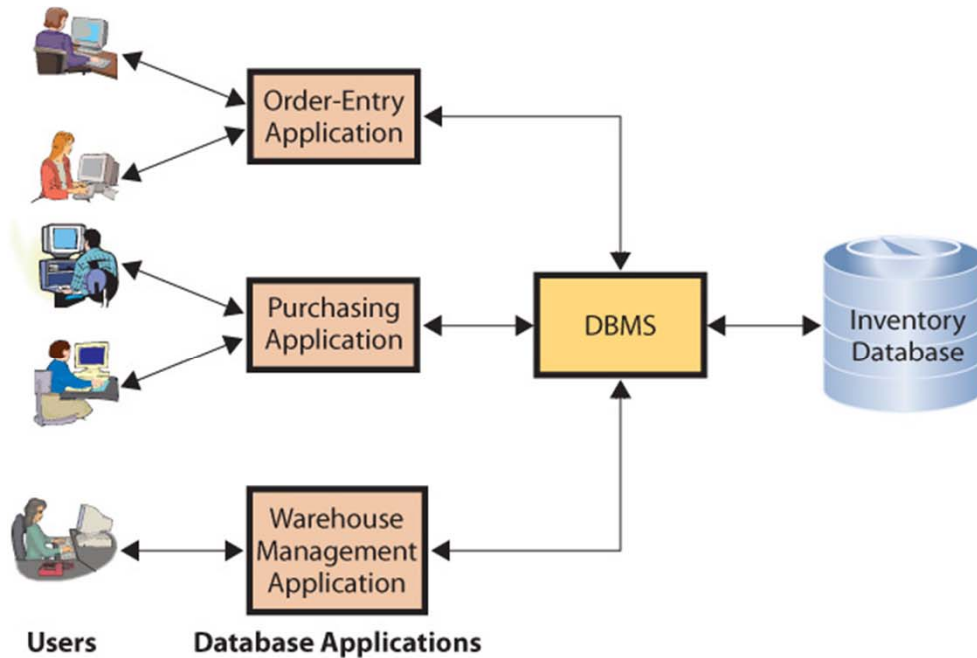
# A DBMS, continued

- Administering the Database
  - DBMS provides tools to assist in administration of database
  - Can be used to set up a security system
  - Used to back up data
  - Add structure to improve performance
  - Remove data

# What is a Database Application?

- Collection of forms, reports, queries, and application programs that process a database
- Databases can have more than one application
- Each applications can have multiple users

# Multiple Database Applications



**Figure 5-10**

Use of Multiple Database Applications

# Forms, Reports, and Queries

## ■ Forms

- Used to read, insert, modify, and delete data

## ■ Reports

- Show data in structured context
- May compute values

## ■ Queries

- Means of getting answers from database data

# Database Application Programs

- Forms, reports, and queries work for standard functions
- Application programs
  - Process logic specific to business need
  - Enables database processing over Internet
    - serves as intermediary between Web server and database
    - responds to events
    - reads, inserts, modifies, deletes data

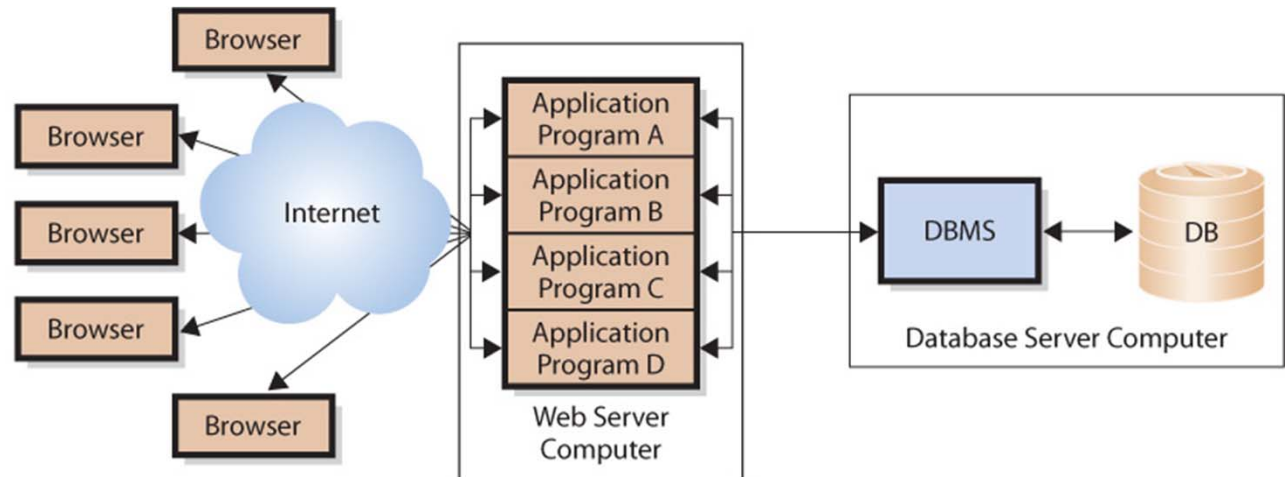
# Multi-User Processing

- Multi-user processing is common
- Unique problems
  - Lost-update problem
  - Locking used to coordinate activities of multiple users
    - creates new set of problems
  - Data conflicts produce inaccurate results

# Four Application Programs on a Web Browser Server Computer

**Figure 5-13**

Four Application Programs  
on a Web Server Computer





# MIS in Use

- The Many Names of One Customer
  - Vancity is Canada's largest credit union
  - Customers can have multiple products, and multiple instances of individual products
  - Challenge was to ensure that the data in the customer information file (CIF), the database that held all customer data, was accurate and identified customers uniquely and completely
  - Problems with incomplete customer information or misidentification of financial records

# MIS in Use Questions

1. How serious a problem is duplicate information to the financial services industry? Is it more serious for some industries than others?
2. Are there any other costs to Vancity when duplicate information is sent to customers?
3. What are the various challenges in cleaning and grooming data?
4. Would the problem be solved by identifying customers numerically? How would customers perceive this? Are there legal issues?

# What is the Difference between an Enterprise and a Personal DBMS?

## ■ Enterprise DBMS

- Process large organizational and workgroup databases
- Support many users and many database applications
  - Examples: DB2, Microsoft's SQL Server, Oracle

## ■ Personal DBMS

- Designed for smaller, simpler database applications
- Supports fewer than 100 users
  - Examples: Access, dBase, FoxPro, Paradox, R:Base

# What do YOU think?

## **Nobody Said I Shouldn't**

- Kelly does systems support and database backups
- He copied one of the database backups to a CD, took it home, and query the data
- Because of that, he was fired
- Company also threatened that if he didn't return all of its data, he will be in court for the next five years

# What do YOU think?

1. Where did Kelly go wrong?
2. Do you think it was illegal, unethical, or neither for Kelly to take the database home and query the data?
3. Does the company share culpability with Kelly?
4. What do you think Kelly should have done upon discovering the odd pattern in Jason's orders?
5. What should the company have done before firing Kelly?
6. "Metadata make databases easy to use—for both authorized and unauthorized purposes." Explain what organizations should do in light of this fact.