

Session: Business Systems  
Topic: Databases

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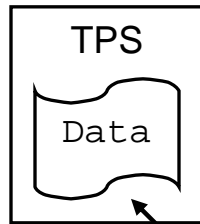
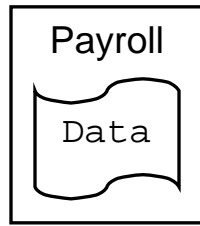
## Data Management

- Business organizations must manage data from many sources
- Data comes from Business Information Systems (such as a TPS)

## Database Management Systems

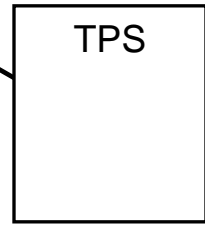
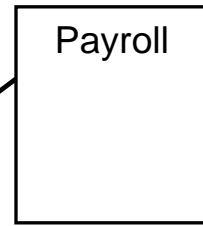
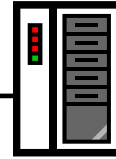
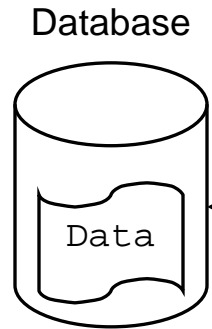
- The actual thing that stores data is the "Database"
- A Database Management System (DBMS) is the front end to the database that provides access to the database
- Other software applications and users go through the DBMS rather than touch the database directly
- This is in contrast to a standalone software program that keeps its own data as part of the program

Standalone Way



If customer addresses are stored in "Data" would need duplicates

DBMS Way



## Database Advantages

- Allows data to be located in one place instead of duplicated (data redundancy)
- Allows data to be easily shared
- Ensures data is organized and maintained according to rules of DBMS
- Help to ensure that stored information is correct (data integrity). Avoiding data redundancy helps
- Simplifies access to database (DBMS provides interface)
- Allows DBMS, as single point of access, to secure data

## Data Organization

### Fields

- Usually the smallest piece of information
- Field itself is given a "field name", field then contains actual "values"
- Fields can often be "typed", or restricted to certain kinds of values ("numeric only", "date format")
- Intended to represent an "Attribute" of some larger object
- Example: "LastName", "PhoneNumber"

### Records

- Contains fields
- Intended to be fields that together describe some object, or "Entity"
- Often each record will have a field that is a unique identifier, or "Primary Key" to individually identify each record
  - Sometimes called an "Uno"
  - Can be a meaningful field (such as "EmployeeID") or simply a unique number
- Example: "Customer" records contain "LastName", "PhoneNumber", "Address"

### Tables (Files)

- Contains a bunch of record
- Usually represented in a grid like a spreadsheet

### Database

- Collection of tables

## Data Organization

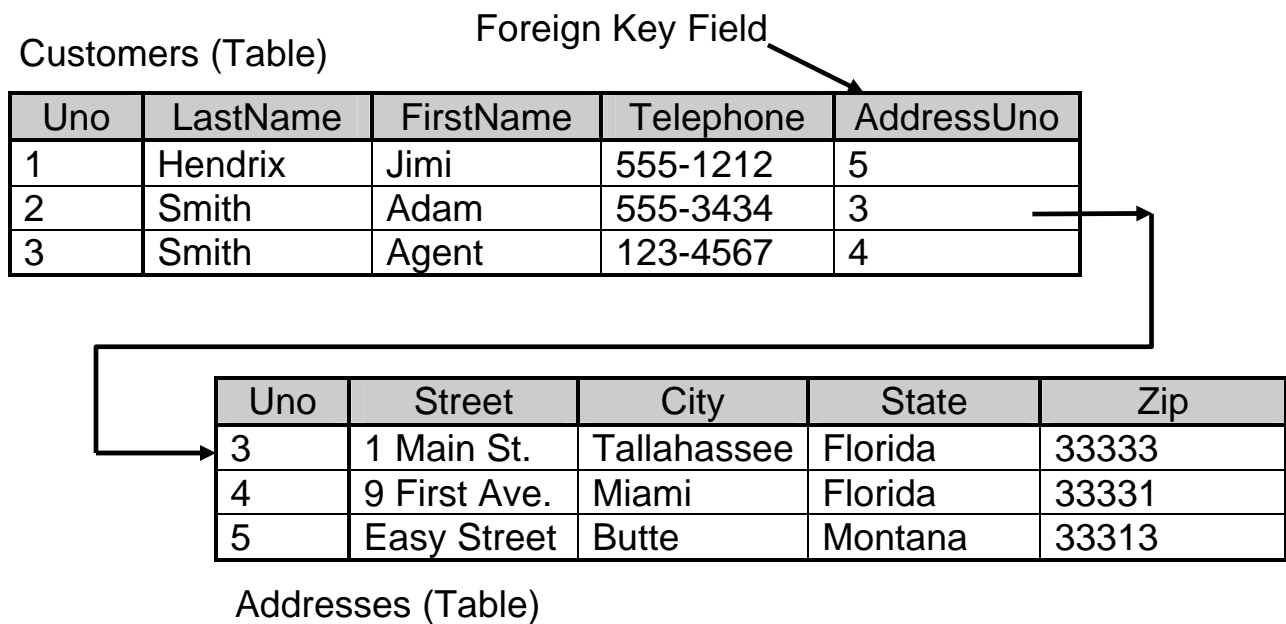
Uno	LastName	FirstName	Telephone	City
1	Hendrix	Jimi	555-1212	Tallahassee
2	Smith	Adam	555-3434	Tallahassee
3	Smith	Agent	123-4567	Miami

In the Database...

- "Entities" are represented by "Records"
- "Attributes" that describe some feature of an "Entity" are represented by "Fields"

## Relational Databases

- Method for organizing data in database by using tables
- Tables are related to each other through their Primary Keys
- That is, fields in one table may contain Primary Keys of other tables as their value to relate a record to another record
- A field that contains the primary key from another table is called a "Foreign Key" field



## Relation Types

- A "one-to-many" relationship is more common, where one record in a table can relate to multiple records in another
- For example, an "Invoices" table may have many entries for a single "Customer"

Invoices (Table)

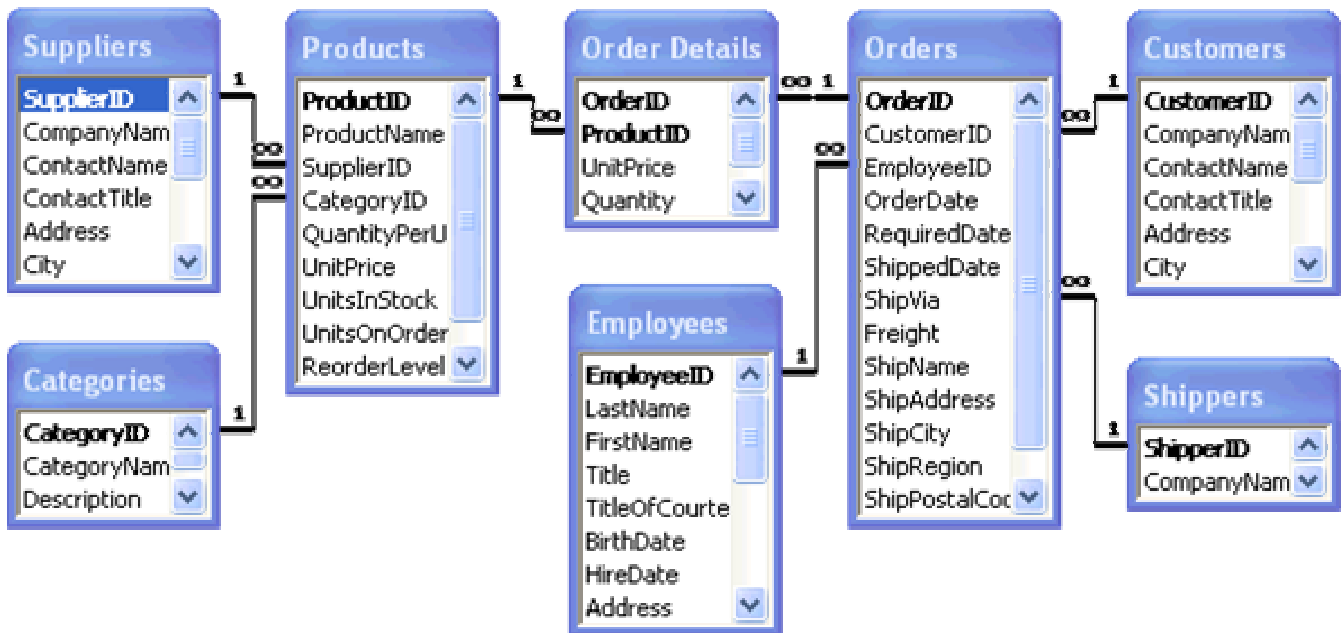
Uno	CustomerUno	Item	Qty	Date
3	2	Widgets	200	10/10/20XX
4	2	Sprockets	50	9/10/20XX
5	3	Widgets	10000	10/10/20XX

Same "Customer" can be related to multiple "Invoices" rows

- Above "Customers" to "Addresses" relationship could be made one-to-many with some modifications
- Would "one" customer typically have "many" addresses?
- A "many-to-many" relationship really means your data organization needs some analysis, possibly using an intermediate table



## Relation Example



## Database Access

- Relational database organization allows information to be "filtered" when retrieved
- That is, only records that satisfy a given criteria are returned
- Example: "Only records with "LastName" field having value "Smith"
- Most databases have a special language for "querying" the database for data
- "Structured Query Language" (SQL) is the most common

## SQL Examples

- Get entire record from "CustomerInfo" table for all records with a LastName value of "Smith"

```
select * from Customers where LastName =  
Smith
```

- Get only "Telephone" field value from "CustomerInfo" table for Adam Smith

```
select Telephone from Customers where  
LastName = "Smith" AND FirstName = "Adam"
```

- Get all LastName and City for every record ("Join" two tables)

```
select Customers.LastName, Addresses.City  
from Customers, Addresses where  
Customers.AddressUno = Addresses.Uno
```

## Database Design

### Schema

- A "Schema" is a formal definition of how data in a database is structured and how tables are related to each other
- DBMS can often use a schema written in a "Data Definition Language" (DDL, SQL) to generate tables and find data

### Data Dictionary

- Typically describes things such as table names, the exact field names contained in each table, and the field types
- Often stored within the database itself and used by programs to find out what kind of data they are accessing
- For example, can be used to determine the "type" of a particular field

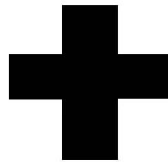
## Some Interesting Database Uses

### Data Warehouse

- A really big database
- Typically tracks a lot of transactions
- Example: Wal-Mart data warehouse has details of every receipt for the past 10 years (or so). The database is half a PetaByte (500 TeraBytes, or 500,000 GigaBytes)
- Allows analysis of trends (what sells most at what times, etc.)

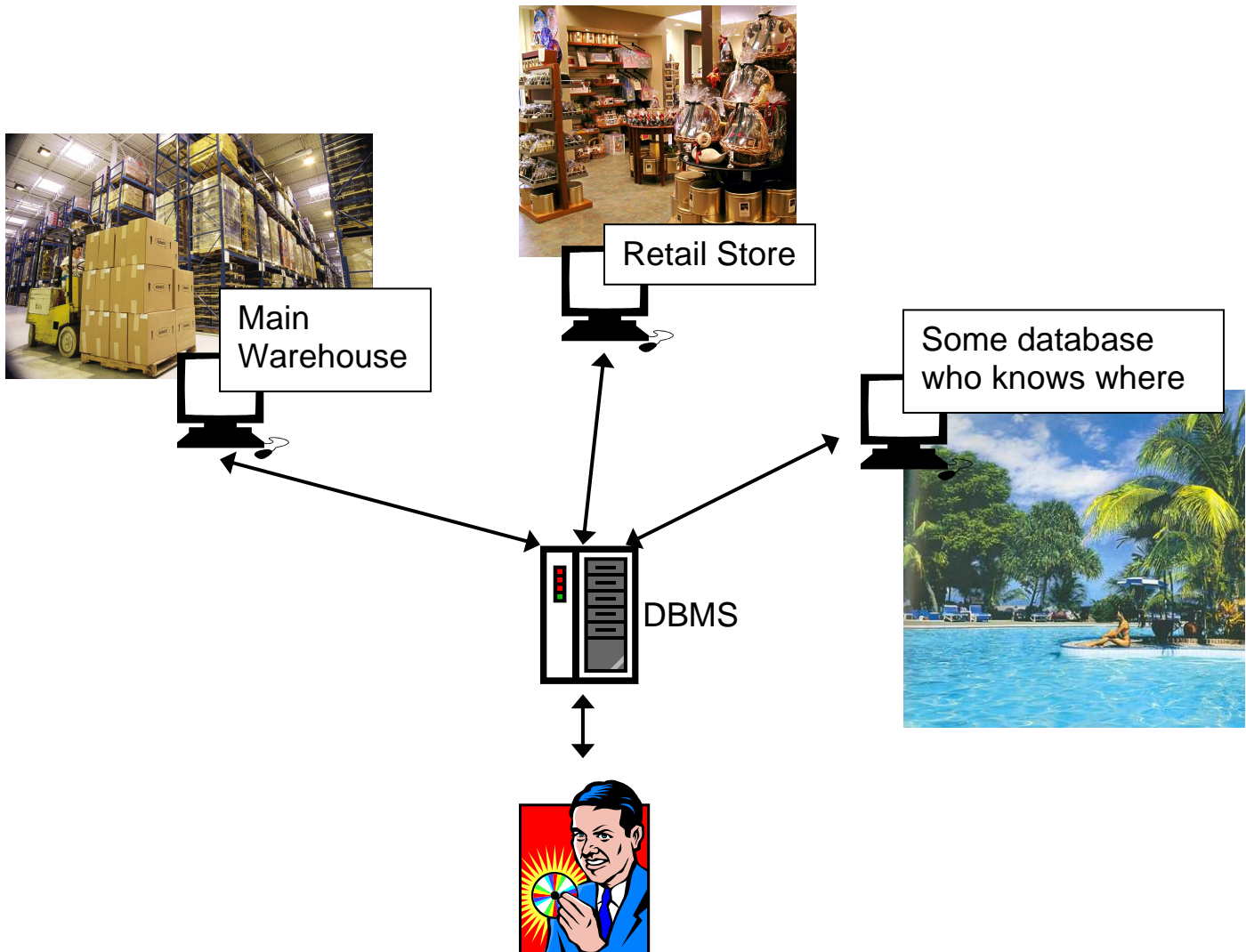
## Data Mining

- You can request specific information you want from a large data store
- But Data Mining analyzes the data store to find information filters you have never thought to look for
- In 1992 Teradata analyzed a retailer's sales data warehouse and discovered that in the evening hours "beer" and "diapers" are frequently purchased together (an affinity)
- Incidentally, Teradata maintains Wal-Mart's data warehouse
- Wal-Mart placed beer next to diapers, with potato chips in between and increased sales of all three



## Distributed Database

- Actual data is spread across several separate databases
- DBMS makes it appear to be one collection of data by providing central point for access
- Lends itself to connecting databases over the Internet



## Employment

- Databases are critical to business organizations
- Database management is a huge task
- Jobs include Database Administrators and development of software programs / web-based programs to access databases
- But almost all employees of significance will have to access the database

## Business Systems

- Almost all systems will access the organizational database
- TPS put data in
- MIS pulls data out and reports it
- DSS, ES pulls data out, uses it and reports it