

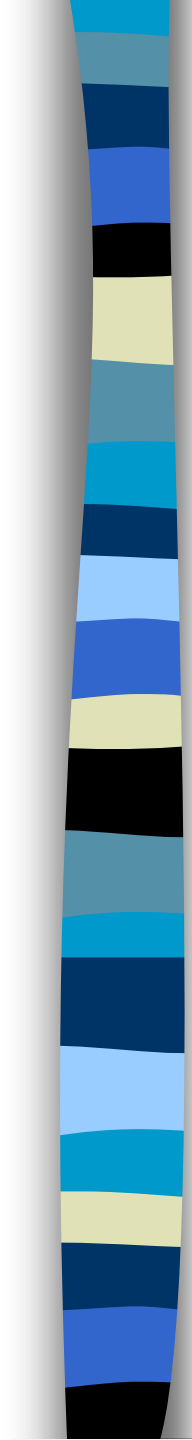


Introduction

- Definition: A computerized record keeping system
- A user would want to be able to do (at least):
 - Adding a new empty table (or file for the time being)
 - Inserting new data
 - Retrieving data
 - Updating data
 - Deleting data
 - Removing tables

An Example of a Relation (a table)

BIN#	WINE	PRODUCER	YEAR	BOTTLES	READY
2	Chardonnay	Buena Vista	1997	1	1999
3	Chardonnay	Geyeser Peak	1997	5	1999
6	Chardonnay	Simi	1996	4	1998
12	Joh Riesling	Jekel	1998	1	1999
21	Fume Blanc	Ch St. Jean	1997	4	1999
22	Fume Blanc	Robt Mondavi	1996	2	1998
30	Gewurztraminer	Ch St. Jean	1998	3	1998
43	Cab Sauvignon	Windsor	1991	12	2000
45	Cab Sauvignon	Geyeser Peak	1994	12	2002
48	Cab Sauvignon	Robt Mondavi	1993	12	2004
50	Pinot Noir	Gary Farrell	1996	3	1999
51	Pinot Noir	Fetzer	1993	3	2000
52	Pinot Noir	Dehlinger	1996	2	1998
58	Merlot	Clos du Bois	1994	9	2000
64	Zinfandel	Cline	1994	9	2003
72	Zinfandel	Rafanelli	1995	2	2003



```
SELECT BIN#, WINE, PRODUCER
FROM CELLAR
WHERE READY = 2000;
```

BIN#	WINE	PRODUCER
43	Cab Sauvignon	Windsor
51	Pinot Noir	Fetzer
58	Merlot	Clos du Bois

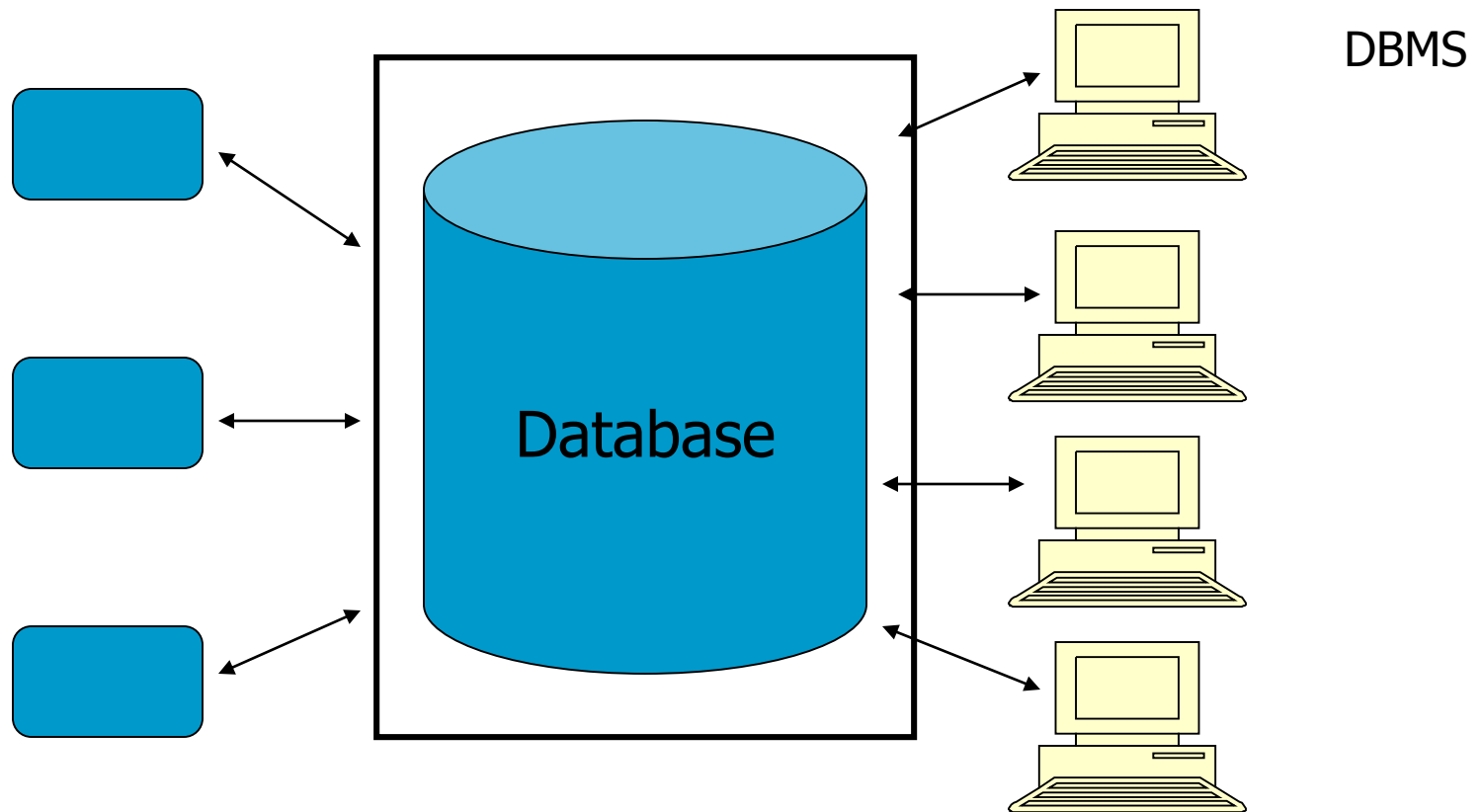
```
INSERT INTO
CELLAR (BIN#, WINE, PRODUCER, YEAR, BOTTLES, READY)
VALUES (53, 'Pinot Noir', 'Saintsbury', 1997, 6, 2001);
```

```
UPDATE CELLAR SET BOTTLES = 4
WHERE BIN# = 3;
```

```
DELETE FROM CELLAR WHERE BIN# = 2;
```

What Is a Database System?

- A computerized system whose overall purpose is to maintain information and to make it available on demand
- Four components: Data, Hardware, Software, and Users



Application programs

1/25/2018

CSC4341

End users



Database Systems (continued)

■ Data

- Integrated

A unification of several distinct files or tables

- Shared

Individual data shared among different users

■ Hardware

- Secondary storage
- Hardware processors

■ Software

- A layer between physical database itself and users
- a. k. a. Database Management Systems (DBMS)
- Support user operations



Users

- Application programmers
 - Writing database application programs
- End users
 - Interact with database systems from online applications or terminals
- Database Administrator (DBA)
 - See more later
- Computer Programs
 - Computer programs directly talking to database systems



What Is a Database?

- Some data is “persistent”, other data is “transient”

Persistent Data: Its lifetime typically exceeds that of application program execution. Persistent from the moment it is created until the moment it is explicitly destroyed.

Examples:

- Product Data
 - Account Data
 - Student Data
- Second definition: A database is a collection of *persistent data* that is used by the application systems of some given enterprises
 - Bank
 - University
 - Government

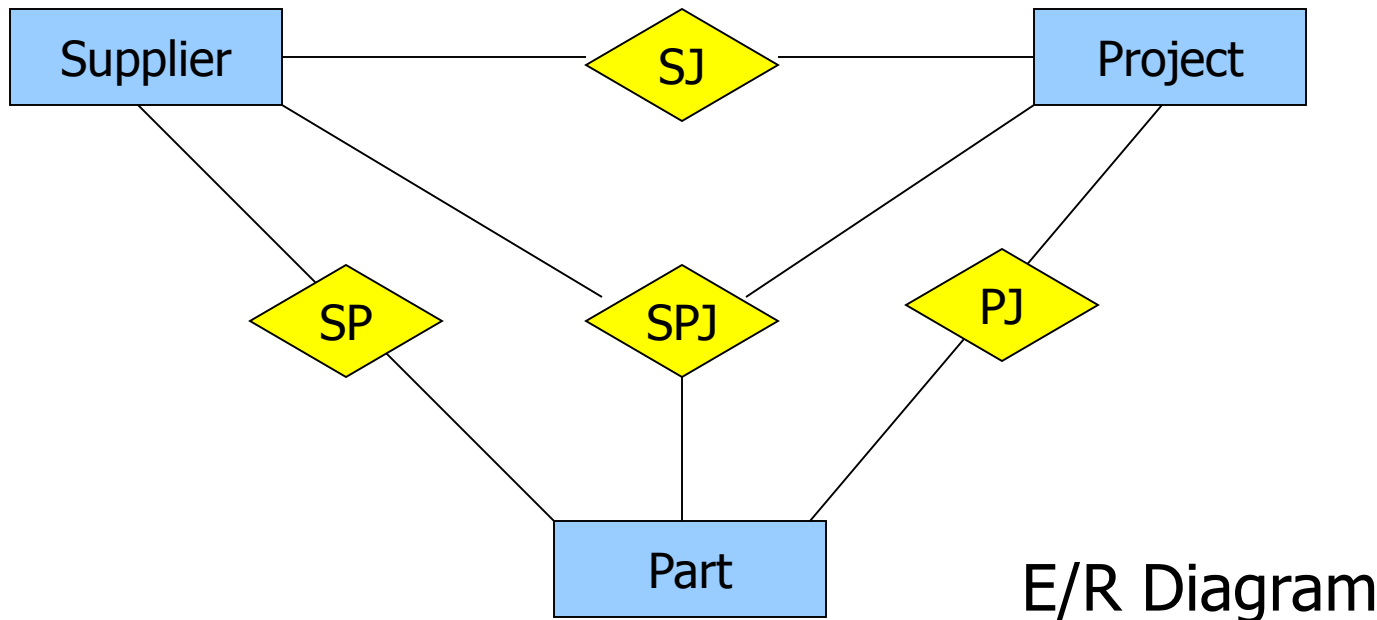
Entities and Relationships (E/R)

■ Entities

- Any distinguishable objects that is deemed to be of interest

■ Relationships

- An association among entities, a special kind of entity.





Why Databases?

- Many obvious advantages
 - Speedy
 - Compact: no need for huge paper files
 - Searchable
 - Current: available on demand at any time
- Also some less obvious advantages
 - Central control of data
 - Redundancy reduced
 - Inconsistencies can be avoided
 - Transaction: (is a logical unit of work, atomicity)
 - Data sharing
 - Standards
 - Integrity: Accuracy or correctness



Relational Systems & Other Database Systems

- A relational database is
 - Data is perceived by the user as tables
 - Operations on data generate answers in the form of new tables
- Why call “Relational”?
- Types of pre-relational database models
 - Hierarchical databases
 - Networks databases and more ...
- Types of post-relational database models
 - Object-relational databases, Object-oriented databases
 - Deductive databases
 - Extendable databases, and more ...



Modern Commercial Databases

- Oracle (Oracle)
- SQL Server (Microsoft)
- MySQL (MariaDB)
- DB2 (IBM)
- SAP Sybase ASE
- Informix (IBM)
- Amazon SimpleDB
- PostgreSQL
- NoSQL Systems (differ from relational DB)