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# TIM 50 - Business Information Systems

## Lecture 16

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## Outline

- Announcements
- MySQL case (cont'd)
- Databases
- Student Presentation ?

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## Announcements

- Reading for 11/21
  - Messerschmitt 11.2 (pp.333-335)
  - Akamai Case (reader pp.217-236)
  
- No class 11/23
  
- Homework #3 out
  
- Database assignment will be posted later this week

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## mySQL Case

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## mySQL

### What does mySQL make?

### How Successful is mySQL?

- Visibility: Fortune magazine, more mentions on www
- Reaction from giants
- Revenue growth 2001 700k, 2002 6.2m, 2003 10m
- Good performance reviews
- Recent SAP alliance
- But Market share tiny:
  - \$10 million out of \$10 billion market!
- **Why Success?**
  - Good Technology
  - Competing (large) DBMSs bloated with features most don't need
  - Innovative OSS model

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## mySQL

### How does OSS work?

### Two Types of License:

- **GPL**
  - Free
  - No Support
  - Any software that uses MySQL as a module must itself be released under GPL
- **Commercial License**
  - Support
  - Could be distributed with non-open source software
  - Not Free:
    - MySQL: Classic \$250, Pro \$495 (for ~ 50 users)
    - Compare to:
      - MSFT \$3150 single proc for 50 users
      - IBM \$33000 single proc for 50 users
      - Oracle \$40000 single proc for 50 users

## Aside: DB's in different software stacks

General Software Stack	ERP Software Stack	Web Application Software Stack	Banking Software Stack
Application	<b>SAP</b> Or Oracle, Axtapa, etc.	Proprietary Business Logic <b>Apache Web Server</b>	<b>Proprietary Banking App.</b>
Middleware (DBMS)	<b>Oracle</b> or MySQL, IBM, etc	<b>MySQL</b> or other DB	<b>Oracle</b> or other DB
Operating System	<b>MS Windows</b> or other OS	<b>Linux</b> or other OS	<b>IBM z/OS</b> or other OS

- Which companies are competitors?
- Which are complimentary to each other?
- Which are both?

## mysql

- Which segments of market is mysql strong in?
  - Large Companies or Small Companies?
  - Web applications or Critical Enterprise data?
- Why would a major enterprise want to pay so much more for an Oracle or IBM DB?

## My SQL: market

	Small 20%	Medium 30%	Large 50%
Enterprise wide data 90%	Microsoft		Oracle IBM Reliability Scalability Support Longevity
Web Sites 10%	My SQL Cost		

How should mySQL grow in order to meet it's stated goal of getting to \$100 million In revenue?

Figure Adapted from "Teaching Note for MySQL Open Source Database," 6/1/04, Stanford GSB.

## My SQL: Growth Strategy

	Small 20%	Medium 30%	Large 50%
Enterprise wide data 90%	Microsoft		Oracle IBM Reliability Scalability Support Longevity
Web Sites 10%	My SQL Cost	Maybe?	

- + Many of these customers already using MySQL with websites
- + Less emphasis on global organization
- + Leverage SAP alliance
- - Up against Microsoft.

Figure Adapted from "Teaching Note for MySQL Open Source Database," 6/1/04, Stanford GSB.

## My SQL: Growth Strategy

	Small 20%	Medium 30%	Large 50%
Enterprise wide data 90%	Microsoft		Oracle IBM Reliability Scalability Support Longevity
Web Sites 10%	My SQL Cost	→	Maybe?

- + builds on existing brand and strengths
- - Market not so big

Figure Adapted from "Teaching Note for MySQL Open Source Database," 6/1/04, Stanford GSB.

## Database Management

## Databases & MySQL Quiz

- 1) In a relational table, each record is represented by
  - a) a row
  - b) a column
  - c) either a row or a column
  
- 2) Who are the top three RDBMS competitors of MySQL?
  
- 3) Linux is
  - a) a proprietary operating system
  - b) a proprietary DBMS
  - c) an open source operating system
  - d) an open source DBMS

## Relational table

Table

Employee		
Name	Address	Dept
Record		

Field/Attribute

## Remember: Data properties

Field name

Table name

**EMPLOYERS**

EMPL_ID	EMPL_NAME	EMPL_POSITION	DEPT.ID
100	Alice	Manager	1
101	Bob	Programmer	1
102	Chris	Manager	2
103	David	Accountant	2

Field Value

Field Type  
e.g. EMPL\_ID is INTEGER  
EMPL\_NAME is STRING

## The Relational Model

NAME	POSITION	DEPARTMENT	DEPT. ADDRESS
Alice	Manager	IT	San Jose
Bob	Programmer	IT	San Jose
Chris	Manager	Finance	New York
David	Accountant	Finance	New York

- Not all data are stored in the same table
  - Avoid data replication/redundancy
  - Enable faster/efficient computations over data



## The Relational Model

### EMPLOYERS

EMPL_ID	EMPL_NAME	EMPL_POSITION	DEPT.ID
100	Alice	Manager	1
101	Bob	Programmer	1
102	Chris	Manager	2
103	David	Accountant	2

### DEPARTMENTS

DEPT. ID	DEPARTMENT	DEPT. ADDRESS
1	IT	San Jose
2	Finance	New York

## The Relational Model

Tables are connected using these **KEYS**

### EMPLOYERS

EMPL_ID	EMPL_NAME	EMPL_POSITION	DEPT.ID
100	Alice	Manager	1
101	Bob	Programmer	1
102	Chris	Manager	2
103	David	Accountant	2

Each table should have a unique identifier for each record: **KEY**

### DEPARTMENTS

DEPT. ID	DEPARTMENT	DEPT. ADDRESS
1	IT	San Jose
2	Finance	New York

## The Relational Model

EMPLOYERS			
EMPL_ID	EMPL_NAME	EMPL_POSITION	DEPT.ID
100	Alice	Manager	1
101	Bob	Programmer	1
102	Chris	Manager	2
103	David	Accountant	2

DEPARTMENTS		
DEPT. ID	DEPARTMENT	DEPT. ADDRESS
1	IT	San Jose
2	Finance	New York

Primary Keys: EMPL\_ID (in EMPLOYERS), DEPT. ID (in DEPARTMENTS)

Secondary Key: DEPT.ID (in EMPLOYERS)

## The Relational Model

- **Relational Model**
  - Based on relational algebra
  - Specifies a suite of *operations/operators* that can be performed on tables
  - These operations are expressed by **SQL commands**

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## SQL interface

- SQL (Structured Query Language)
  - Forms an "interface" between an application and the DBMS
    - For manipulating, and extracting data from database
  - Standardized, not vendor specific
  
  - Encapsulates various internal details
    - Data partitioning and replication
    - Host mapping
    - File representation
    - etc.
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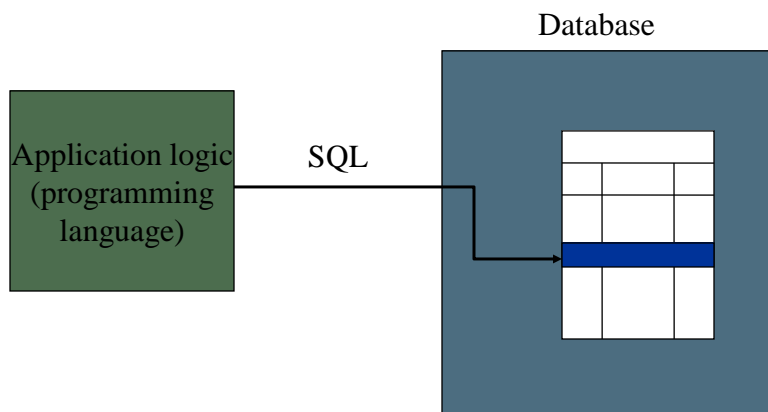
## Database Operations

EMPLOYERS				DEPARTMENTS		
EMPL_ ID	EMPL_NAME	EMPL_POSITION	DEPT. ID	DEPT. ID	DEPARTMENT	DEPT. ADDRESS
100	Alice	Manager	1	1	IT	San Jose
101	Bob	Programmer	1	2	Finance	New York
102	Chris	Manager	2			
103	David	Accountant	2			

**JOIN**  
**EMPL\_DEPT**

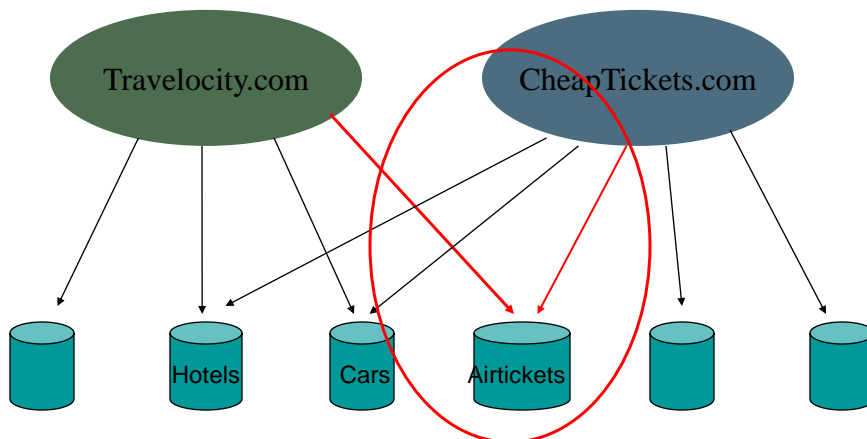
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## Application Logic and Tables



## mySQL Case

### Example - Travel Agency



Two applications might try to access & update the same resource concurrently