Class announcements

- Thursday:
  - Assignment 4 due
  - Messerschmitt Ch 18 (493-512)

- 3rd database tutorial:
  - Friday, May 21st, from 11am-12:30pm
Student Presentations
Standardization
Purpose of a standard?

- Allow products or services from different suppliers or providers to be interoperable
Scope of a standard

Included:

- interfaces (physical, electrical, information)
- architecture (reference model)
- formats and protocols (FAP)
- compliance tests (or process)

Excluded:

- implementation
- (possibly) extensions
Some issues

Once a standard is set

- becomes possible source of industry lock-in; overcoming that standard requires a major (~10x?) advance
- may lock out some innovation

In recognition, some standards evolve

- IETF, CCITT (modems), MPEG
- backward compatibility
Types of standards

**de jure**
- Sanctioned and actively promoted by some organization with jurisdiction, or by government

**de facto**
- Dominant solution arising out of the market
- Voluntary industry standards body

Industry consortium

Common or best practice

Examples?
Examples

*de jure*
- GSM, ISDN Telephone interface

*de facto*
- Microsoft Windows API (Application Programming Interface)
- Intel Pentium instruction set

Voluntary industry standards body
- IEEE (Institute of Electrical and Electronic Engineers)
- IETF (Internet Engineering Task Force)

Industry consortium
- W3C (World Wide Web Consortium)
- SET (Secure Electronic Transactions)

Best practice
- Windowed GUI
The changing process

- As technology and industry move more quickly, the global consensus standards activity has proven too unwieldy
  - e.g. ISO
- "New age" standards activities are more informal, less consensus driven, a little less political, more strategic, smaller groups
  - e.g. OMG, IETF, ATM Forum, WAP
- Programmable/extensible approaches for flexibility
  - e.g. XML, Java
Reasons for change

- From government sanction/ownership to market forces
  - Increasing fragmentation
  - Importance of time to market

Greater complexity

- Less physical/performance constraint for either hardware or software
Lock-in

(Particularly open) standards reduce consumer lock-in

- Consumers can mix and match complementary products

Increase supplier lock-in

- Innovation limited by backward compatibility
- e.g. IP/TCP, x86, Hayes command set
Aside: Network Effects

- The value of owning some products goes up if lots of other people have it too.
  - Examples?

- This phenomenon is called “network effects”

- How do standards influence network effects?
Network effects

Standards can harness network effects to the industry advantage
- Revenue = (market size) x (market share)

Increases value to customer
Increases competition
- Only within confines of the standard
- But forces customer integration or services of a system integrator

Slide adapted from slides for Understanding Networked Applications by David G Messerschmitt. Copyright 2000. See copyright notice.
Why standards?

*de jure* are customer driven to reduce confusion and cost

*de facto* standards are sometimes the result of positive feedback in network effects

Customers and suppliers like them because they
- increase value
- reduce lockin

Governments like them because they
- promote competition in some circumstances
- May believe they can be used to national advantage
Approaches

Consensus
- ISO

Collaborative design
- MPEG

Competitive “bake off”
- IETF

Coordination of vendors
- OMG
Open vs. Proprietary Standards

- Open standard - a standard that is well documented, unencumbered by intellectual property rights and restrictions, and available to any vendor.

- What are the advantages?

- What are the disadvantages?
Why companies participate

Pool expertise in collaborative design
  - e.g. MPEG

Have influence on the standard

Get technology into the standard
  - Proprietary, with expectation of royalties
  - Non-proprietary

Reduced time to market
Standards applied to Business Processes?

- Can you standardize business processes?

- Yes!
  - ISO 9000
    - A set of standardized business processes for Quality Management.
    - Supports TQM (Total Quality Management)
  - RosettaNet
    - A set of standardized business processes, and accompanying standardized data interfaces/formats for conducting e-business.
Databases

by

David G. Messerschmitt
Databases

Treat data as a separate asset

- May be shared by multiple applications

Provide protection and integrity features appropriate to mission-critical data

- Access control
- Integrity constraints
- Persistence
- etc.
Two capabilities

**Aggregation:** accessing multiple databases

**Sharing:** two or more applications accessing the same databases
**Relational table**

<table>
<thead>
<tr>
<th>Table</th>
<th>Employee</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>Address</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Record</th>
<th>Field</th>
</tr>
</thead>
</table>
SQL interface

- SQL (Structured Query Language)
- Presents single abstract interface to the application logic
  - For manipulating, and extracting data from database
- Standardized, not vendor specific

- Encapsulates various internal details
  - Data partitioning and replication
  - Host mapping
  - File representation
  - etc.
Database operations

<table>
<thead>
<tr>
<th>Departments</th>
<th>Employees</th>
</tr>
</thead>
</table>

Each operation results in a new table

“PROJECT”

“SELECT”
Database Operations

### Passengers

<table>
<thead>
<tr>
<th>Name</th>
<th>Dept ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice</td>
<td>1</td>
</tr>
<tr>
<td>Bob</td>
<td>1</td>
</tr>
<tr>
<td>Chris</td>
<td>2</td>
</tr>
</tbody>
</table>

### Departments

<table>
<thead>
<tr>
<th>Dept Name</th>
<th>Dept ID</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>1</td>
</tr>
<tr>
<td>Sales</td>
<td>2</td>
</tr>
</tbody>
</table>

JOIN

<table>
<thead>
<tr>
<th>Name</th>
<th>Dept ID</th>
<th>Dept Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice</td>
<td>1</td>
<td>Engineering</td>
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<td>Engineering</td>
</tr>
<tr>
<td>Chris</td>
<td>2</td>
<td>Sales</td>
</tr>
</tbody>
</table>
### Entries are simple data types or compositions of those types
- Integer, string, etc.
Markup languages
Definition

A *markup language* describes the structure of a document

- Based on tags
- Tags denote structural elements like sections, subsections, figures, etc

Internationally standardized, so application independent
Example: HTML

```html
<html>
<h1> Super Widget </h1>
<h2> Widgets Incorporated </h2>
<em> 123456789 </em>
<br>
<p> $300 </p>
</html>
```

Super Widget

Widgets Incorporated

123456789

$300
Example: XML

Tags Emphasize what the things *mean* rather than how to *format* their Presentation.

```xml
<xml>
  <product>
    <model> Super Widget </model>
    <make> Widgets Incorporated </make>
    <sku> 123456789 </sku>
    <price> $300 </price>
  </product>
</xml>
```
XML in Ecommerce example

<xml>
  <product>
    <model>Super Widget</model>
    <make>Widgets Incorporated</make>
    <sku>123456789</sku>
    <price>$300</price>
  </product>
</xml>

Stuff4U

Super Widget
$300

Amazing Gadget
$500

Supplier

Product info
From each Supplier sent in XML

Retailer

Consumer
XML in ecommerce example 2

Supplier

Product info
From each Supplier sent in XML

<xml>
  <product>
    <model>Super Widget</model>
    <make>Widgets Incorporated</make>
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    <price>$300</price>
  </product>
</xml>

Super widget recognized and managed by SCM software.

XYZ Manufacturing
Family lineage

- **SGML**: Standardized in mid 80s by ISO
- **HTML**: Introduced in Early 90s
  - Emphasizes formatting and presentation of documents
- **XML**: Proposed in mid 90s
  - Emphasizes structure of documents
  - Purpose- and industry-specific extensions
Break!
mySQL Case
mySQL student talk
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
- Large DBMS bloated with features most don’t need
- Innovative OSS model
**MySQL**

How does OSS work?

**Two Types of License:**

- **GPL**
  - Free
  - No Support
  - *Any software that uses MySQL as a module must itself be made 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

<table>
<thead>
<tr>
<th>General Software Stack</th>
<th>ERP Software Stack</th>
<th>Web Application Software Stack</th>
<th>Banking Software Stack</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Or Oracle, Axtapa, etc.</td>
<td>Apache Web Server</td>
<td></td>
</tr>
<tr>
<td>Middleware</td>
<td>Oracle</td>
<td>MySQL</td>
<td>Oracle</td>
</tr>
<tr>
<td></td>
<td>Or MySQL, IBM, etc</td>
<td>or other DB</td>
<td>or other DB</td>
</tr>
<tr>
<td>Operating System</td>
<td>MS Windows</td>
<td>Linux</td>
<td>IBM z/OS</td>
</tr>
<tr>
<td></td>
<td>or other OS</td>
<td>or other OS</td>
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</tbody>
</table>

- Which companies are competitors?
- Which are complimenters?
- Which are both!?
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

<table>
<thead>
<tr>
<th>Enterprise wide data 90%</th>
<th>Small 20%</th>
<th>Medium 30%</th>
<th>Large 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Microsoft</td>
<td></td>
<td>Oracle</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>IBM</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Longevity</td>
</tr>
<tr>
<td>Web Sites 10%</td>
<td>My SQL Cost</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

How should mySQL grow in order to meet its 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

- Lack of Brand identity in this segment
- MySQL lacks the organization to offer support
- Large enterprises have high switching costs

Figure Adapted from “Teaching Note for MySQL Open Source Database,” 6/1/04, Stanford GSB.
**My SQL: Growth Strategy**

<table>
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<td>Longevity</td>
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</table>

| Web Sites (10%)       | My SQL Cost |              |             |
|                       |             | Stay Put?    |             |

- Not a big enough market to reach stated $100 million goal.

Figure Adapted from “Teaching Note for MySQL Open Source Database,” 6/1/04, Stanford GSB.
**My SQL: Growth Strategy**

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<td></td>
<td></td>
<td>Longevity</td>
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- 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

## Key Points:

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

### Market Segmentation:

<table>
<thead>
<tr>
<th>Segment</th>
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<td>Maybe?</td>
<td></td>
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