Class announcements

- Assignment 3 out today

- Wednesday 11/16:
  - ??

- Reading for next class:
  - Ch. 15.3.1 - 15.3.3, 15.3.6, 15.4 of Messerchmitt (pp. 426-430, 432-437)

Student Presentations

Today:
Natalja Robinetts (Sun)

Components, Suppliers

Component: A subsystem purchased “as is” from an outside vendor

(Alternative – building your own subsystem)

A component implementation is encapsulated (although often configurable)

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**System Integration, Emergence**

**System Integration:**
take the components, add custom developed subsystems, make them interact → reach higher level goal

**Emergence:** new capabilities and functions of a system that subsystems and components could not have provided by themselves.

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**Supplier Types**

- Three types of infrastructure/application suppliers:
  - Component Suppliers
  - Custom Subsystem Developers
  - System Integrators
- (Some suppliers are 2 or even 3 of above.)

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**Four possibilities (examples)**

<table>
<thead>
<tr>
<th>Application</th>
<th>Infrastructure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft Office</td>
<td>Hotmail</td>
</tr>
<tr>
<td>Internet DNS</td>
<td>Domain Name System</td>
</tr>
</tbody>
</table>

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**Application Service Providers**

- Two types
  - Bundled
    - An infrastructure provider bundles applications with their infrastructure
    - Example: AOL, telephony service providers
  - Unbundled
    - A provider of an application service without providing an infrastructure service
    - Examples?

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**Examples of unbundled ASP model**

- Web-based calendar (e.g. Yahoo, Google)
- Web-based email (e.g. Hotmail, Gmail)
- Web-based stock trading (e.g. Charles Schwab)

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**Application acquisition**

- Develop internally
- Buy as product
- Contract development
- Product w/ customization

- Software supplier
- Outsource developer
- Supplier, consultants

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*Slide adapted from slides for Understanding Networked Applications*  
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The changing industry structure

Stovepipe vs. Integrated Infrastructure

**Stovepipe Architecture**  
---or---  
**Turnkey Solution**
- Single supplier provides all encompassing solution  
- (complete with infrastructure)

**Integrated Infrastructure**
- Separate infrastructure that can support many applications

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**Application and Infrastructure**

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From stovepipe to layering

**Stovepipe vs. Integrated Infrastructure**

- What are some examples of each?
  - Telephone network  
  - Broadcast tv  
  - Internet  
  - Pc

- What are the advantages of each approach?

**Vertical Integration - Diversification**

- Two approaches for companies wishing to expand their product offerings

- A company is **vertically integrated** when it makes rather than buys the subsystems in its products. Example: IBM

- A **diversified** company produces products across different industry segments. Example: Compaq

**Less Vertical Integration - More Diversification?**

- Why do customers favor less vertical integration?
  - Prefer competition amongst component suppliers
  - Mix and match components - free choice, but at a price
  - Reduced lock in

- Disadvantages??
  - Customer needs to integrate components from different suppliers.
Less Vertical Integration - More Diversification

Why do customers favor diversification (in the application space)?
- Reduce coordination costs by having to deal with fewer suppliers.
- Fewer vendors overall ➔ less chance of toxic interactions.

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

The Standardization Process
- Before something becomes a standard requires...
  - recognition of its need by a standards body/industry/government
  - commitment of monetary and human resources by participants
- Usually, is an ongoing process
  - Refinements/Extensions

Examples:
- W3C: [http://www.w3.org/](http://www.w3.org/)
Some issues

- Slow and cumbersome process

- Once a standard is set
  - becomes possible source of industry lock-in; overcoming that standard requires a major advance
  - may lock out some innovation

Why do companies participate?

- Influence the standard
- Gain expertise and implement prototypes
  - Faster time to market than competitors
  - Gain intelligence about competitors
  - That might be part of the standardization body as well
- May benefit financially through patent protection and royalties
  - Maintaining ownership of proprietary technology
  - Many companies contribute their expertise to design something bigger

Types of standards

- **de jure**
  - Sanctioned and actively promoted by some standardization body, or by government

- **de facto**
  - Standard practice
  - Dominant solution arising out of the market, or
  - Recommended by voluntary industry standards body

- Examples?

Examples

- **de jure**
  - GSM (global for mobile communication),
  - ISDN (Integrated Services Digital Network)

- **de facto**
  - Windowed GUI
  - Java
  - Internet protocols

Voluntary industry standards body

- IEEE (Institute of Electrical and Electronic Engineers)
- IETF (Internet Engineering Task Force)
- EPCglobal (RFID standard for UHF)

Industry consortium

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

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. W3C, IETF, 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
Open vs. Proprietary Standards

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

- What are the advantages?

- What are the disadvantages?

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.
    - BPEL (Business Process Execution Language)
      - An XML-based language for the formal specification of business processes and business interaction protocols

The role of Venture Capital in Computing

- **Start-Ups**: Open interfaces allow small firms to contribute components without having to develop entire solution

- High risk for VCs
- Diversification
  - Each VC funds multiple start-ups
  - Each start-up funded by multiple VCs

- Is this model successful? For the start-up? For the VC? For the customers? Why?

MySQL Case

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

**Two Types of License:**
- **GPL (General Public License (GNU))**
  - Free
  - No Support
  - Any software that uses MySQL as a module must itself be made GPL-compliant
- **Commercial License**
  - Support
  - Could be distributed with non-open source software
  - Not Free:
    - MySQL: Classic $250, Pro $495 (for ~ 50 users)
    - Compare to:
      - MSFT $1350 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>Application</td>
<td>SAP or Oracle, Adapta, etc</td>
<td>Proprietary Business Logic</td>
<td>Proprietary Banking App.</td>
</tr>
<tr>
<td>Middleware</td>
<td>Oracle or MySQL, IBM, etc</td>
<td>MySQL or other DB</td>
<td>Oracle or other DB</td>
</tr>
<tr>
<td>Operating System</td>
<td>MS Windows or other OS</td>
<td>Linux or other OS</td>
<td>IBM z/OS or other OS</td>
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</table>

- Which companies are competitors?
- Which are complementers?
- 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?
- How should MySQL proceed? What are the advantages/disadvantages?

MySQL: market

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

MySQL: Growth Strategy

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

MySQL: Growth Strategy

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

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<td>Maybe?</td>
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- + 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.