Outline For Today

- Class Announcements
- Student Presentations
- Alibris
- Messerschmitt Ch4

Class announcements
- Assignment 3 due today!
- Reading for next class
  - Messerschmitt Ch 5, Sun Case
  - Suggestion: Read Messerschmitt Ch5 first.
- Student Presentations Wed.
  - Scott Welch: news article
  - Peter Yao: Sun-N Tier case

Class announcements
- Business Paper Proposal due October 20
  - 1-2 pages
  - Discuss:
    - What you plan to include in your paper
    - How you plan to organize it
    - Include a list of some references you plan to cite.
    - Check out class webpage for more details
    - Come to office hours this week if needed
- Midterm October 25
  - Next week!
  - Study:
    - Terms
    - ROI calculations
    - Case Studies
  - Study guide on website.

Student Presentations
- Brandi Carter
- Lilian Nguyen

Recall, Alibris
- A start-up to sell used books on the Internet.
- Interloc, Alibris' predecessor, functioned like a classified ads page for book dealers
- Alibris changing Interloc's model
  - Actually sell the books
  - Charge a fee per sale (instead of per listing)
  - Intermediary strategy
    - Buy books from dealers
    - Ship to warehouse
    - Re-pack, consolidate order, ship to customer
If Interloc is so successful, why change it?

What will change as Interloc becomes Alibris?

Why did Manley feel they needed the Sparks facility?

How does the Sparks facility keep them from becoming disintermediated?

Should Alibris actually buy books and fill up the Sparks facility?

What problems is Alibris having with its e-commerce capabilities?

Why is Alibris having so much trouble setting up simple e-commerce capabilities?

Is this really that hard??

Is it rare for a new-software product from an established, reputable vendor not to work properly?

Should Alibris stick with Oracle? Or switch back to Thunderstone?

Should Manley take the "white knight's" offer and fire the whole IT staff??!
Alibris

- Rejects "white knight" offer
- Manley secures another bridge loan
- Goes Live 1998
- Thunderstone's software works ok
- 1 million books at Sparks warehouse by 2000
  - Originally all on consignment from dealers
  - Later, purchases books
- 2002 – Revenue $31 million, loss $7.2 million
- 2003 – Revenue $45.5 million, loss $4.8 million
- March 2004 files for "auction based" IPO
  - May 2004, withdraws IPO after price too low
  - Still Relying on Private Financing

Data and information

by

David G. Messerschmitt

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Key concept

The key commodity manipulated by information technology is information
To be manipulated in a computing/networking environment, information must be represented by data

What is information?

Data

A bit is "0" or "1" — the atom of the information economy
Data is a collection of bits, like
  - "0101110111010110"
  - "0000011"
  - "111011101101011010111011011010"
Note: the terms data and information are not always used consistently!
Representation

- Take the place of the original
- Equivalent to, in the sense that the original can be reconstructed from its representation
- Often the original can only be approximately reconstructed, although it may be indistinguishable to the user
  - e.g. audio or video

ASCII

<table>
<thead>
<tr>
<th>Character</th>
<th>Hex</th>
<th>Binary</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;7&gt;</td>
<td>/x37</td>
<td>00110111</td>
</tr>
<tr>
<td>=6</td>
<td>/x38</td>
<td>00111000</td>
</tr>
<tr>
<td>&gt;7</td>
<td>/x39</td>
<td>00111001</td>
</tr>
<tr>
<td>&lt;&gt;</td>
<td>/x3A</td>
<td>00111010</td>
</tr>
<tr>
<td>;&gt;</td>
<td>/x3B</td>
<td>00111011</td>
</tr>
<tr>
<td>&lt;&lt;=</td>
<td>/x3C</td>
<td>00111100</td>
</tr>
<tr>
<td>&gt;=</td>
<td>/x3D</td>
<td>00111101</td>
</tr>
<tr>
<td>&gt;/&gt;&gt;</td>
<td>/x3E</td>
<td>00111110</td>
</tr>
<tr>
<td>?&lt;&gt;</td>
<td>/x3F</td>
<td>00111111</td>
</tr>
<tr>
<td>&lt;At&gt;</td>
<td>/x40</td>
<td>01000000</td>
</tr>
<tr>
<td>&lt;A&gt;</td>
<td>/x41</td>
<td>01000001</td>
</tr>
<tr>
<td>&lt;B&gt;</td>
<td>/x42</td>
<td>01000010</td>
</tr>
<tr>
<td>&lt;C&gt;</td>
<td>/x43</td>
<td>01000011</td>
</tr>
<tr>
<td>&lt;D&gt;</td>
<td>/x44</td>
<td>01000100</td>
</tr>
<tr>
<td>&lt;E&gt;</td>
<td>/x45</td>
<td>01000101</td>
</tr>
<tr>
<td>&lt;F&gt;</td>
<td>/x46</td>
<td>01000110</td>
</tr>
<tr>
<td>&lt;G&gt;</td>
<td>/x47</td>
<td>01000111</td>
</tr>
</tbody>
</table>

Note that this representation is not unique…
…this one happens to be a standard (ANSI X3.110-1983)

A picture

This picture conveys information

This information is represented in this computer, but how?

Representation of picture: image

Expanding a small portion of the picture, we see that it is represented by square pixels…
…300 tall by 200 wide…
…with a range of 256 intensities per pixel

An approximation:
300 • 200 • 8 bits = 480,000 bits (but it can be compressed)

Color picture

A color picture can be represented by three monochrome images…

At the expense of three times as many bits

Terminology

Data

- Representation
- Data processing
- Communicate data to another user or organization
- Information

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Representation needs to be standardized

- If the representation is not standardized, the information is garbled!

Communicate data to another user or organization

Regeneration

- Make a precise copy of the data (copy bit by bit)
- If you know the representation, this is equivalent to making a precise copy of the information
- Each such precise copy is called a generation
- Process is called regeneration

Replication of information

- Anything that can be regenerated can be replicated any number of times
- This is a blessing and a curse

Analog information cannot be regenerated

- Analog information can be copied, but not regenerated
- We will never know exactly what the original of this Rembrandt looked like

Discrete information can be regenerated

- Regeneration can preserve data (but not its original physical form)
- Regeneration is possible for information represented digitally (which is tolerant of physical deterioration)
- Every .xxx DOS file is a representation

Replication of information requires knowledge of representation
Implications

Digitally represented information can be preserved over time or distance in its precise original form by occasional regeneration

- digital library
- digital telephony

Replication of data is easy and cheap

Implications (con't)

- Replication of information requires knowledge of the structure and interpretation
  - Standardization or some other means
- Extreme supply economies of scale
- You can give away or sell and still retain
- Unauthorized replication or piracy relatively easy

Architecture

by

David G. Messerschmitt

Three elements of architecture

A system is decomposed into interacting subsystems

Each subsystem may have a similar internal decomposition

Decomposition
Functionality
Responsibility
Interaction
Cooperation
System examples

Let's quickly look at some system decomposition examples
- Quick tour of information technology systems

Time sharing

- Point-to-point wire (no network)
- ASCII terminal (no graphics)
- Mainframe (database and application server)

Two-tier client/server

- Local-area network
- Server/Mainframe

Three-tier client/server

- Client
- Enterprise data server
- Application server

Inter-organizational computing

- Global internet

Consumer access
**System integration**

Architecture -> subsystem implementation ->
  system integration
Bring together subsystems and make them cooperate properly to achieve desired system functionality
- Always requires testing
- May require modifications to architecture and/or subsystem implementation

**Emergence**

Subsystem are more specialized and simpler functionality
Higher-level system functionality arises from the interaction of subsystems
Emergence includes capabilities that arise purely from that interaction (desired or not)
- e.g. airplane flies, but subsystems can't

**Why system decomposition?**

- Divide and conquer approach to containing complexity
- Reuse
- Consonant with industry structure (unless system is to be supplied by one company)
- Others?

**Networked computing infrastructure**

by David G. Messerschmitt

**Major subsystems**

- Presentation
- Application software
- Logic/Data
- Infrastructure software
- Network
- Infrastructure equipment
- Server host

**Layering**

Elaboration or specialization

- Existing layers

Layering builds capability incrementally by adding to what exists
Layering

Elaboration or specialization
Services
Existing layers

Simplified infrastructure layering

<table>
<thead>
<tr>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distributed object management</td>
</tr>
<tr>
<td>Network software</td>
</tr>
<tr>
<td>Network equipment</td>
</tr>
<tr>
<td>Communications</td>
</tr>
</tbody>
</table>

Operating system functions

Graphical user interface (client only)
Hide details of equipment from the application
Multitasking
Resource management
  - Processing, memory, storage, etc
  
File is:
  - Unit of data managed for the benefit of the application
    - Size known, but unspecified structure and interpretation
  - Name
  - Location in naming hierarchy

Network equipment

Messages and packets

Simplest network communication service is the message
  - Smallest unit of communicated data meaningful to application
  - Size, but unknown structure and interpretation
  - Analogous to file in storage

Internally, the network may fragment a message into packets, and reassemble those packets back into a message
Example

```
<table>
<thead>
<tr>
<th>Application</th>
<th>Operating system</th>
<th>Network</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web server</td>
<td>File</td>
<td>Fragmentation</td>
</tr>
<tr>
<td>Screen Web browser</td>
<td>Message</td>
<td>Collection of packets</td>
</tr>
<tr>
<td>HTML</td>
<td>Message</td>
<td>Assembly</td>
</tr>
</tbody>
</table>
```

Communication middleware

New application-specific communication services
Location independence
- makes distributed application look similar to centralized
Many possible other functions

Storage middleware

Database
- File with specified structure
- Example: relational table
- Oriented toward business applications

Database management system (DBMS)
- Manage multiple databases
- Basis of online transaction processing (OLTP)

Some DBMS functions
- Logical structure separated from physical structure
- Platform independence
- Implement standard queries
- Access from multiple users/applications
- Manage data as asset separate from applications

The Internet

by
David G. Messerschmitt
**What is the Internet**

Internet = the major global internet
An internet is a "network of networks"
- Interconnect standard for LANs, MANs, and WANs
A private internet is called an intranet
An extranet is an interconnection of intranets through the Internet

**Intranet**

Private internet
May be connected to Internet
- Firewall creates a protected enclave

**Extranet**

Intranets connected through an unprotected domain (typically the Internet)
Encryption and other security technologies used to
- Protect proprietary information
- Prevent imposters, vandals, etc

---

**Extranet**

Intranet
Extranet
Firewall
Global Internet
Intranet

---

**Extranet**

Consumers, field workers, etc.
Intranet

---

Lock icon indicates this is an extranet
Questions

What business purposes do nomadic workers serve?
Mobile?
What advantage does direct Internet access have over long distance telephony?

Ideas and examples (Chapters 4-5)

by
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Example

Peer to peer
Web browser

Web server

Customer logic

Fulfillment logic

Databases

Customers

Merchandise

Orders

Inter-enterprise e-commerce

Book merchant

Fullfillment logic

Outside links

Acquirer bank

Book distributors

Customer logic

Acquirer bank

Merchandise

Orders

Databases

Customers

E-commerce

Inter-enterprise e-commerce

e-commerce

Inter-enterprise

e-commerce

Understanding Networked Applications

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