TIM 50 - Business Information Systems

Lecture 8

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UC Santa Cruz

October 20, 2015
Class Announcements

- Database Assignment 1 Due TODAY, 10/20
  - Business Paper/Project: Due Tue, 10/27
  - (regular) Assignment 3: Due Th, 10/29
- Midterm: 10/22
E-commerce and the Internet

The Benefits of Disintermediation to the Consumer

- Manufacturer → Distributor → Retailer → Customer: $48.50
- Manufacturer → Retailer → Customer: $40.34
- Manufacturer → Customer: $20.45

Figure 9-2

Essentials of Management Information Systems
Chapter 9 E-Commerce: Digital Markets, Digital Goods
Key Concepts in E-commerce: Digital Markets and Digital Goods In a Global Marketplace

- Digital goods
  - Goods that can be delivered over a digital network
    - E.g., music tracks, video, software, newspapers, books
  - Cost of producing first unit almost entire cost of product: marginal cost of producing 2nd unit is about zero
  - Costs of delivery over the Internet very low
  - Marketing costs remain the same; pricing highly variable
  - Industries with digital goods are undergoing revolutionary changes (publishers, record labels, etc.)
Types of E-commerce

- Business-to-consumer (B2C)
- Business-to-business (B2B)
- Consumer-to-consumer (C2C)
- Mobile commerce (m-commerce)
E-commerce: Business and Technology

**E-commerce Business Models**

- Portal
- E-tailer
- Content provider
- Transaction broker
- Market creator
- Service provider
- Community provider
E-commerce Revenue Models

- Advertising
- Sales
- Subscription
- Free/Freemium
- Transaction fee
- Affiliate
Web 2.0, Social Networking, and the Wisdom of Crowds

- Most popular Web 2.0 service: social networking
  - Social networking sites sell banner ads, user preference information, and music, videos and e-books.
- Social shopping sites
  - Swap shopping ideas with friends (Kaboodle, ThisNext)
- Wisdom of crowds
  - Large numbers of people can make better decisions about topics and products than a single person.
- Prediction markets: peer-to-peer betting markets on specific outcomes (elections, sales figures, designs for new products)
E-commerce Marketing

- Internet provides marketers with new ways of identifying and communicating with customers.
- Long tail marketing:
  - Sell large number of unique items
  - Relatively few of each item sold
- Behavioral targeting: tracking online behavior of individuals on thousands of Web sites.
- Advertising formats include search engine marketing, display ads, rich media, and e-mail.
How an Advertising Network Works

- **Merchant Site**
  - Merchant server connects to DoubleClick ad server

- **Advertising Network**
  - Ad server reads cookie; checks database for profile
  - Ad server selects and serves an appropriate banner ad based on profile
  - Network Member Firms
  - DoubleClick follows consumer from site to site through use of Web bugs

- **Consumer**
  - Consumer requests Web page from ad network member site

Diagram shows the flow of information between the merchant site, the advertising network, and the consumer.
Networked Computing in direct Procurement

- History predates Internet
- **Electronic Data Interchange** (EDI)
  - Exchange order information between firms involved in direct procurement
  - Usually large firms who could afford proprietary communication links
  - Initially order and invoice
  - Existed since 70’s
Business-to-Business Electronic Commerce: New Efficiencies and Relationships

• Electronic data interchange (EDI)
  
  • Major industries have EDI standards that define structure and information fields of electronic documents for that industry.
  
  • More companies increasingly moving away from private networks to Internet for linking to other firms.
In Class Exercise (Next week)

- Use a laptop or phone and log in to Alibaba.com
- Pretend you are a small business in the US needing cheap products. Do a search, and say what your “story” is.
  - E.g. “We pretend to be a retailer aiming to sell American flags at marked up prices. We’ll search for American flags…”
  - E.g. “We pretend to be a contractor looking for cheap supplies. We’ll Search for “toilet.”
  - E.g. “We pretend to be a beach shop selling tourist goods. We’ll search for “sunglasses.”
- How do the prices you get compare to retail prices? Are there minimum quantities to make an order?
- Are the first listings from “gold” suppliers?
- Do these suppliers seem to be large companies or small to medium sized?
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?
Information

From a user (human) perspective...
....recognizable patterns that influence you in some way
(perspective, understanding, behavior...)

In the computing infrastructure, information has a somewhat different connotation as structure and interpretation added to data.
Data

A bit is “0” or “1” — the atom of the information economy

Data is a collection of bits, like

- “0101110111010110”
- “0000011”
- “11101110101101010111011011011010”

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>Alphabet</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>&lt;8&gt;</td>
<td>/x38</td>
<td>00111000</td>
</tr>
<tr>
<td>&lt;9&gt;</td>
<td>/x39</td>
<td>00111001</td>
</tr>
<tr>
<td>&lt;:&gt;</td>
<td>/x3A</td>
<td>00111010</td>
</tr>
<tr>
<td>&lt;;&gt;</td>
<td>/x3B</td>
<td>00111011</td>
</tr>
<tr>
<td>&lt;&lt;-</td>
<td>/x3C</td>
<td>00111100</td>
</tr>
<tr>
<td>&lt;=&gt;</td>
<td>/x3D</td>
<td>00111101</td>
</tr>
<tr>
<td>&lt;/&gt;&gt;</td>
<td>/x3E</td>
<td>00111110</td>
</tr>
<tr>
<td>?&gt;</td>
<td>/x3F</td>
<td>00111111</td>
</tr>
<tr>
<td>&lt;@&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>
</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

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

Information

Representation

Communication data to another user or organization

Data

Data processing

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

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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)

\[ \text{0 + noise } \rightarrow \text{ 0} \]
\[ \text{1 + noise } \rightarrow \text{ 1} \]
Replication of information requires knowledge of representation.

Replication of information also presumes knowledge of its representation.

Replication preserves the integrity of the data, but that is not sufficient.

Every .xxx DOS file is a 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
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

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What is Architecture?

How do you architect a solution?
A system is decomposed into interacting subsystems.

Each subsystem may have a similar internal decomposition.
Three elements of architecture

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System examples

Let’s quickly look at some system decomposition examples

- Quick tour of information technology systems
Time sharing

ASCII terminal
(no graphics)

Point-to-point wire
(no network)

Mainframe
(database and application server)
Two-tier client/server

Local-area network

Server/Mainframe
Three-tier client/server

Client

Application server

Enterprise data server
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

Subsystems 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

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Layering

Elaboration or specialization

Services

Existing layers
Example of Layering: networking

- Physical
  - Bits
  - Frames
  - Packets
  - Messages

- Link
  - Bits

- Network
  - Frames

- Transport
  - Packets

- Application
  - Messages
Software Layering

Application

Middleware

Operating System
Operating system functions

- Graphical user interface (client only)
- Hide details of equipment from the application
- Multitasking
- Resource management
  - Processing, memory, storage, etc
- etc
Middleware Functions

- Capabilities that can be shared by many applications, but that is not part of OS
  - Example: Database Management System (DBMS)
- Hide details of OS from application
  - Java Virtual Machine
- More purposes we’ll talk about later.
What’s a database?

Database

- File with specified structure
- Example: relational table
<table>
<thead>
<tr>
<th>Year</th>
<th>City</th>
<th>Accommodation</th>
<th>Tourists</th>
</tr>
</thead>
<tbody>
<tr>
<td>2002</td>
<td>Oakley</td>
<td>Bed&amp;Breakfast</td>
<td>14</td>
</tr>
<tr>
<td>2002</td>
<td>Oakley</td>
<td>Resort</td>
<td>190</td>
</tr>
<tr>
<td>2002</td>
<td>Oakland</td>
<td>Bed&amp;Breakfast</td>
<td>340</td>
</tr>
<tr>
<td>2002</td>
<td>Oakland</td>
<td>Resort</td>
<td>230</td>
</tr>
<tr>
<td>2002</td>
<td>Berkeley</td>
<td>Camping</td>
<td>120000</td>
</tr>
<tr>
<td>2002</td>
<td>Berkeley</td>
<td>Bed&amp;Breakfast</td>
<td>3450</td>
</tr>
<tr>
<td>2002</td>
<td>Berkeley</td>
<td>Resort</td>
<td>390800</td>
</tr>
<tr>
<td>2002</td>
<td>Albany</td>
<td>Camping</td>
<td>8790</td>
</tr>
<tr>
<td>2002</td>
<td>Albany</td>
<td>Bed&amp;Breakfast</td>
<td>3240</td>
</tr>
<tr>
<td>2003</td>
<td>Oakley</td>
<td>Bed&amp;Breakfast</td>
<td>55</td>
</tr>
<tr>
<td>2003</td>
<td>Oakley</td>
<td>Resort</td>
<td>320</td>
</tr>
<tr>
<td>2003</td>
<td>Oakland</td>
<td>Bed&amp;Breakfast</td>
<td>280</td>
</tr>
<tr>
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<td>Albany</td>
<td>Bed&amp;Breakfast</td>
<td>6750</td>
</tr>
</tbody>
</table>
Storage Middleware example: DBMS

- **Database Management System (DBMS)**
  - Manage Multiple databases
  - Allow multiple applications to access common databases
  - Implement standard data “lookup” (query) functions.