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Internet Technology and E-Business

Dr. Peter R. Gillett
Associate Professor
Department of Accounting & Information Systems
Rutgers Business School – Newark & New Brunswick
Additional Citation

Overview

- Electronic Commerce Software
- Digital Products!
- Digital Pricing continued from last week!
- XML: a little detail – (XML is used for E-Logistics)
- E-Commerce Tutorial
- Internet2: a first look
- “Dot-Com Business-Models from Mars”
- Data-Mining: the very basics
- Spring Break . . .
Electronic Commerce Software

Requirements:
- Catalog Display
- Shopping Cart
- Transaction Processing
  - Volume Discounts
  - Shipping Costs
  - Sales Tax
  - Middleware
- Tools to populate & maintain the catalog
- Tools to create & edit site content
Electronic Commerce Software

- Electronic Commerce Tools
- Application Servers
  - Page servers
  - Database managers
  - Content management
- Marketing
- Hosting (see also Chapter 8)
Electronic Commerce Software

- **Basic Packages**
  - Fundamental Host Services
  - Banner Advertising Exchange Sites
  - Full-Service Shared-Mall Hosting
    - Yahoo! Store, etc.
  - Estimated $2,670 total first year cost

- **Mid-Range Packages**
  - $2,000 - $10,000
    - Commerce Server 2000, etc.

- **Enterprise Solutions**
  - $200,000 - $10,000,000
    - IBM, Netscape, Oracle, Intel/SAP
Digital Products

- Some key legal issues
  - Copyright (50 after author’s death, 75 after publication for corporation or 100 after creation)
  - Service Marks (effectively forever)
  - Patents (20 years)

- Digital paradigm: lease software and don’t sell it!
- What about facts, lists, phone books, etc.?
- How about databases?
Digital Products

- High cost of copyright control and checking
- Always changing web pages and copyright: ASP, JSP, etc.
- Use of digital keys to help in copyright and Service Marks
  - How?
  - Public Key?
“Bicycle Exchange” Example

- Alice wants to give her bike to Bob
  - They never see each other
  - Completely non-overlapping shifts
  - Each has a bike lock

How can Alice get her bike to Bob?

What type of exchange is this?
Digital Products

- This is a Public-Key protocol for information exchange!
- How can Public-Key cryptography protocols help us with copyright?
- Digital Watermarks?
- Limiting use?
Price Struggle: focus on the price attribute for gaining market share

Choi et al.: “competition based only on price is often ineffective because profits for all competitors are sacrificed as prices are lowered in each round of struggle for market share.”

Product differentiation moves away from the focus on price to other attributes.
Digital Pricing

Why is pricing a big issue in E-Marketing?

- Transparent pricing and specifications
- Auctions
- Online Customization (one-to-one marketing!)
- Lots of data on consumer preferences
XML in Detail

- Why was HTML a success?
  * Easy
  * Case insensitive
  * Forgiving
  * Tightly defined

- These reasons should boost XML
  * HTML has weaknesses that XML fills in
  * XML has other purposes in addition to presentation
In essence, XML is “a language for creating other languages”

This is by defining your own Tags

Each “new language” (set of user defined tags) is an *XML Application*

XML’s parsers are much more picky than typical HTML parsers
**XML in Detail**

- All XML documents must be “well formed”
- All well formed XML documents are “guaranteed” to run
- Well formed
  - Required Root Element: wrapped around entire XML file
  - Required Closing Tags for each defined open tag, except for `<tag1 arg="foobar"/>` types
  - XML is case sensitive
XML in Detail

- Well formed
  - Proper Nesting:
    - `<animal> <name> foo</name> </animal>`
  - Attribute values must be in quotation marks
  - Entity references (new tags) must be declared (in a DTD or Schema) before they are used

- Optional XML declaration:
  - `<?xml version="1.2"?>`
XML in Detail

- DTDs: Document Type Definition
  - Declare custom tags and rules
- XML Schema: which attributes or rules are required or allowed to compile a document
  - Not required
  - Used in validation of XML documents
- XML Schema replacing DTDs for XML
XML in Detail

- Shortcomings of DTDs
  - DTDs are not XML themselves!
  - DTDs have global variables only
    - Can’t defined two tags with the same name even if these tags are in different contexts
  - DTDs cannot specify the type of information in an element

- W3C defined XML Schemas, which may replace XML DTDs
XML in Detail

- XML Schemas are written in XML
- XML Schema overcomes all shortcomings of DTDs just listed
- Each XML Schema has two sections
  - Simple types: elements of only text
  - Complex types: elements that contain attributes or other elements
- In-File Schema or Other-File Schema
XML in Detail

- Schema in other files
- Declare the schema or schemas as the root element
  - Example: `<xsd:schema xmlns::xsd = http://www.andromeda.rutgers.edu/~pgb/scm1>`
  - `</xsd:schema>`
- This web address is the “name space” and all variables with the prefix “xsd” are declared here
XML in Detail

- Between the `<xsd:schema>` and `</xsd:schema>` tags we have the Schema Rules

- `xmlns:xsi=http://foo.bar/file_here`
  - Indicates Simple Schema’s Location
XML in Detail

- Simple types in Schema
- Examples:
  - `<xsd:element name="weight" type="xsd:string"/>
  - `<xsd:element name="population" type="xsd:integer">
- See http://www.w3.org/TR/xmlschema-2/
- Many complex types: date, time, custom
XML in Detail

- XML validation
- Must have all name spaces and declarations
- Test with a Validator
  - www.w3.org/2000/06/webdata/xsv
  - www.stg.brown.edu/service/xmlvalid
- XHTML, etc.
XML in Detail

- We can use Cascading Style Sheets (CSS) to display XML.
- Data binding allows us to display XML from within HTML pages to give us the best of both worlds.
- XSLT transforms XML into other XML, HTML, spreadsheet, etc. (server or client side).
XML in Detail – a DTD

<!DOCTYPE officeBookInventory[
<!ELEMENT officeBookInventory (book)>]
<!ELEMENT book (title, author, publisher, howUsed, notes>]
<!ATTLIST book type CDATA #REQUIRED>
<!ELEMENT title (#PCDATA>]
<!ELEMENT author (#PCDATA>]
<!ELEMENT publisher (#PCDATA>]
<!ATTLIST publisher date CDATA #IMPLIED>]
<!ELEMENT howUsed (#PCDATA>]
<!ATTLIST howUsed class (yes|no) #REQUIRED research (yes|no) #REQUIRED cd (yes|no) #REQUIRED>]
<!ELEMENT notes (#PCDATA>]
]>

Dr. Peter R Gillett
March 12, 2003
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<salesOrder>
    <dateSoldOn>04/01/2001</dateSoldOn>
    <item>
        <itemDescription>Speedo swimsuit</itemDescription>
        <itemRetailPrice>29.95</itemRetailPrice>
        <itemSalePrice>24.95</itemSalePrice>
    </item>
    <shipping>
        <shippingMethod>UPS ground</shippingMethod>
        <shippingCost>4.00</shippingCost>
    </shipping>
</salesOrder>
E-Commerce Tutorial

- Plan out your Web Site
  - What are you trying to do?
    - Probably multifaceted
    - Isolate each target
  - How do you measure your success?
    - Try to measure success fast
    - Dynamically update details
  - Testing, building, iterate again!
E-Commerce Tutorial

- Start small, measure, polish, iterate
- A web site is not a one-off project!
  - This is one of the biggest problems!
- Examine each step of the purchase model!
- Sales and Marketing Cycle:
  - Advertise and awareness
  - Sales and Service
  - The Sale!
  - Post Sales Service!
E-Commerce Tutorial

- Examine the Information Structure of your Web Site
  - Is it a shallow tree or a deep tree?
  - One of your purposes is to provide consumers with information
  - Beware of Cycles!

- Compare the costs with their Brick-and-Mortar Equivalents (don’t be too cheap!)

- Build Requirements Documents
E-Commerce Tutorial

Details to recall:

- Promotions (traditional and web)
- Transaction Processing (amazon.com One-Click)
- Fulfillment (shipping and tracking)
- Post-sales service (web portal)
- Marketing and Data Analysis (data mining)
- Company/Product Branding (e-products)
E-Commerce Tutorial

E-Store Front Design

- Don’t count out the Internet Shopping Experience
  - Make it easy for consumers to become customers!
  - How can you measure consumers becoming customers?
  - Build loyalty! How can you measure loyalty on the Internet?
- Cross-selling is enhanced by the Internet
- Life event selling is enhanced by the Internet
- Sweet Spots and the Internet!
- Familiarity breeds sales . . .
E-Commerce Tutorial

- Develop E-Marketing and E-Logistic Strategies
- Some strategies:
  - Free Shipping on large orders
  - Make it simple: one fee for shipping
  - Get some more information for your database on each transaction
  - Be very careful in limiting surprises
E-Commerce Tutorial

- Credit Card/Debit Card Transactions
- Can’t charge customer until they receive the product
  - Authentication
  - Authorization
  - Settlement
- Link Web-Log data with transactions
E-Commerce Tutorial

- Measure and consider cost-of-sales for both brick-and-mortar and Internet
10 Golden Rules: Argenti & Boritz

- Keep it simple
- Make it fast
- Build trust
- Give Directions
- Welcome the shopper
- Create communities
- Service the customer
- Think globally
- Shipping must be easy
- Let the world know
Internet2: a first look

- Partnership of
  - 190 Universities
  - Industry
  - Government

- Goals from www.internet2.edu:
  - Leading edge network for national research community
  - Enable revolutionary applications
  - Ensure rapid transfer to industry

- Convergence?
Internet2: a first look

- Fat pipes initiative
- High bandwidth for convergence
- Very preliminary stages
  * Some of the present experiments
  * End-to-end performance initiative
  * Need good performance measures
- What types of performance measures?
- Business applications?
See Russ Hubby’s Document “End-to-End Performance”

Overall end-to-end performance depends on at least:

- Implementation
- Operation
- Applications design

Discussed as research - how about business?
Internet2: a first look

Key Issues:
- Multicast
- QoS
- RTP (media streaming protocol)
- TCP
- Gigabit flows > 200 Mbps (ATM, etc.)
- Low Latency (< 60ms)

Room for specialized applications
Internet2: a first look

- Host Computer and Host Operating System can effect network performance of Host and other computers
- Example: make the memory used by TCP very large
  - Can cause “disk swapping”
  - This will slow the computer and its network functions!
- New proposals for Host/Operating System
- How to optimize past this?
“Dot-Com B-Models from Mars”

From Business Week:

- Amazon.com lost a total of about $1.5 Billion from its start in 1994 to Sept. 2000
- Amazon is still going strong
- Many other sinking dot-coms
- Market has shifted from B2C to B2B
"Dot-Com B-Models from Mars"

- Toilet Paper Model: selling consumer commodities
  - Webvan and Peapod
  - What went wrong?
- The "Whatever" model: Keep trying ‘till someone gets it right’
  - mortgage.com, which, after losing $11 million on revenue of $11 million started in another market
  - AskJeeves started selling directly to firms
“Dot-Com B-Models from Mars”

- Mal-Content Model: make money on angry people
  - Salon lost $18.3 million on sales of $8 million
  - Who pays?

- Just Plain Crazy Models
  - Buy.com sell goods at wholesale prices
Data Mining for the Internet

- What is Data Mining?
  - CRM and Data Mining
  - Security and Data Mining

- Why is it particularly applicable on the Internet?

- Automated Sales Analysis vs. Data Mining
Data Mining: the very basics

- Relational Databases: Codd @ IBM
  - Related data in tables
  - Rows and Columns for specific attributes
- Why Databases on the Web?
  - Necessary
  - Easy to interface due to the connectivity of the Web
- SQL: Structured Query Language
- Generally training and testing sets
Data Mining: the very basics

- SQL example:
  - `select` customers `with` annual_income >= 100,000
  - The rows are customers
  - The columns include “annual_income” as a field
  - The columns have other information, such as address, people in household, email address, etc.
Data Mining: the very basics

- Trying different features
- Many algorithmic approaches
- Artificial Neural Networks
  - McCulloch and Pitts
  - Simulate the real thing
  - Trigger-based

- Basic parts:
  - Input
  - Hidden layers
  - Output layers
Data Mining: the very basics

- Uses Supervised Learning
  - Training and testing sets
- Forward Propagation
- Back Propagation - feed forward
Data Mining: the very basics

Pros:
- Quick
- Efficient
- Good pattern matchers

Cons:
- Hard to reverse-engineer
- Usual problems with data mining: you must be careful with training and testing sets
Electronic Payment

- Electronic Cash
  * PayPal, etc.
- Electronic Wallets
  * W3C Proposed Standard
  * ECML Standard
- Stored-Value Cards
- Credit and Charge Cards
- SET
Spring Break

- Weee!!!
- There is LOTS of reading assigned for the following week – it would be a good plan to get a head start...
- Don’t forget that Group Project Proposals are due on March 26
- With the aid of readings, and a good search engine or two, can you define and explain briefly the following:
Internet Technologies

- URL
- TCP
- IP
- TTL
- ICMP
- UDP
- HTTP
- FTP
- SGML
- HTML
- XHTML
- DHTML
- XML
- RFC
Internet Technologies

- IAB
- IETF
- ISP
- DNS
- POP3
- SMTP
- IMAP
- MIME
- OLAP
- CRM
- OSI
- EDI
- CGI
- PERL
Internet Technologies

- VBScript
- ActiveX
- JVM
- Java
- JavaScript
- Jscript
- J++
- J#
- J Builder
- Java Beans
- JDBC
- JMS
- JSP
- J2EE
Internet Technologies

- JPEG
- GIF
- RGB
- CMYK
- CSS
- RSA
- DES
- MD5
- AES
- SSL
- S-HTTP
- PPP
- PAP
- CHAP
Internet Technologies

- PGP
- SET
- ORB
- PHP
- VPN
- URI
- DTD
- XML Schema
- XPath
- XLink
- XPointer
- XSLT
- XBRL
Internet Technologies

- ASP
- ADO
- MOM
- WSDL
- UDDI
- COM
- DCOM
- DOM
- IIOP
- IDL
- RPC
- RMI
- CORBA
- SOAP