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Internet Technology and E-Business

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Additional Citation

- “XML for the World Wide Web”: E. Castro, Peachpit Press, 2001

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?

Digital Products

- "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?

Digital Pricing

- 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

XML in Detail

- 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)
- Download free software from httlp://www.xmlspy.com

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)>
]
>
```

XML in Detail – an Order

```
<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?

Internet2: a first look

- 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 $11million 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