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***Internet Technology and
E-Business***

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- “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 <http://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