

eTrading 2
Technologies Underlying eTrading

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E-Trading
Technologies Underlying eTrading

Agenda

1. Web-Commerce
2. Shopping Carts
3. AJAX
4. Web 2.0
5. Mobile Technologies
 - Devices
 - Wireless Comms

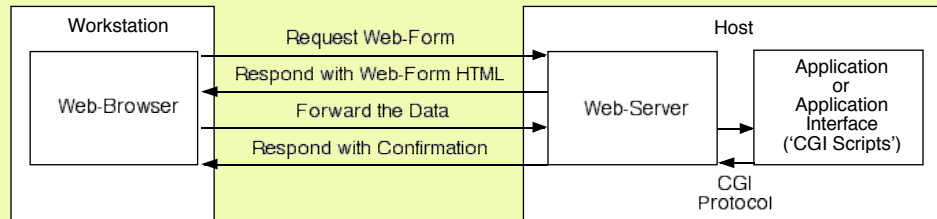
1. Web Commerce

- The Web-Form Feature of HTML
- Web-Browsers That Support Forms
- HTTP POST
- Servers and CGI
- Gatewaying into the EFT / POS System

Web-Forms

- A web-page with additional markup tags
- These instruct the web browser how to display the various elements of a form, such as:
 - checkboxes / tickboxes / buttons
 - user-editable text areas
- The browser does not process the data (with exceptions)
- But the web server also does not process the data
- The process is as follows:
 - the user keys in data
 - the browser passes it to the web-server, using the POST method
 - the browser passes it to a separate, purpose-built program or script

Web-Form Processing



Communications Between the Web-Server and the Application CGI (Common Gateway Interface)

- CGI is the protocol that supports transfer of data between the web-server and the application
- A **CGI script** is a program designed to process data passed to the web-server from a browser
- In principle, a CGI script can be written in any programming language
- Much-used are **Perl, PHP, C and Java**, plus proprietary languages and tools such as **Cold Fusion, MS VisualBasic and Applescript**

Beyond Web-Servers to 'eCommerce Servers'

- Enhanced web-servers which also offer functions relevant to eCommerce (e.g. interfaces to product and customer data, shopping basket, credit-card gateway)
- They include:
 - IBM WebSphere
 - BEA WebLogic
 - Tomcat (open source)
 - Allaire JRun
 - Oracle Application Server

2. Shopping Carts

- The Metaphor
- The Process
- The Infrastructure it depends on
- Major Feature-Variants

The Process

- (1) Display of Items Available for Purchase
- (2) The User's Selection Action
click on a selection, or type a quantity
(active use, or default 'single-click use')
- (3) Processing of the Selection
request from browser via web-server to app
validation and state-maintenance
response from app via web-server to browser
- (4) The User's Further Actions
select further items, amend or delete a selections,
'display shopping-cart contents', 'proceed to checkout';
if nothing, eventually time-out of the session
- (5) The Processing of the Order

Variations to the Shopping Cart Method

- Prior Acquisition of Customer-Related Data
- Pre-Processing of Item-Related Data
- Pre-Processing of Customer-Related Data
- Enhanced User Interface Features
- Transaction Suspension
- Enhanced Checkout Features

3. AJAX

- Java Applets
- ActiveX Controls
- 'Asynchronous JavaScript and XML' (AJaX) creates an 'Ajax engine' within the browser and subvert the Web's 'pull' model
 - XMLHttpRequest Method supports data retrieval from the server 'asynchronously', i.e. without forcing a refresh of the entire browser-window

Java

- Java is just another programming language
- However, many browsers incorporate a Java run-time interpreter (called a '**Java Virtual Machine**'– JVM) or a Just-in-Time compiler. (In the case of recent versions of MSIE, it has to be downloaded and installed)
- A Java program designed to be downloaded to and run by a browser is called a **Java applet**

Java Applets and Security

- Java applets are meant to be secure, reliable, robust
- They are meant to play within a limited 'sandbox', rather than having access to the whole workstation
- But there are some doubts about those assurances
- Java applets provide a powerful client-side capability
- Depending on the purposes for which they're used, and how well they are designed and constructed, they may be dangerous and/or invasive
- The standard of programming is dreadful, and many applets malfunction, at least in some browsers

OLE => ActiveX => .COM ==> .NET

- ActiveX is a proprietary Microsoft technology for managing software components used by MSIE
- An ActiveX 'control' is code, written in any programming language, which can be requested by one node to be executed by another node
- The request is passed to another program resident on the remote node, esp. a web-browser
- .NET is a proprietary Microsoft environment for application software development

ActiveX

- There is no 'sandbox'. Access is given not just to the browser but to the entire workstation
- The designer thereby gains enormous power over remote workstations
- An ActiveX 'control' can be 'authenticated', but that doesn't assure that it will not be harmful
- ActiveX security problems are far worse than Java:
"The embedding of ActiveX into the Internet Explorer web browser created a combination of functions that has led to an explosion of computer virus, trojans and spyware infections" (Wikipedia entry for ActiveX)

JavaScript / ECMAScript / JScript

- Javascript is an extension to the HTML specification
- It enables the web-page designer to cause the web-browser to perform some kinds of processing
- One very effective use is to check whether a form that the user is about to send to the server contains all of the required data
- But:
 - implementation details vary across browsers
 - its use can cause accidental harm
 - it is insecure, and is used for harmful purposes

Motivations for AJAX

- Additional Facilities:
 - 'Mixing'
 - 'Mash-ups' – more or less ad hoc combination of content from multiple sources e.g. maps and descriptive data
- 'Lightweight Programming Models' – in reaction against over-blown 'Web Services'

'Lightweight Programming' – AJAX

- 'Asynchronous JavaScript and XML'
- A Successor to the vague 'Dynamic HTML'
- Applies well-established tools:
(X)HTML / CSS -> XML, JavaScript / ECMAScript
- Utilises the XMLHttpRequest Method of HTTP in particular to enable partial-window-refresh
- **Involves an 'Ajax engine' within the browser, which intercepts and processes user-requests and server-responses**

4. Web 2.0

- Pre-Cursors to Web 2.0
- The Dimensions of Web 2.0
 - Content Syndication
 - Advertising Syndication
 - Storage Syndication
 - Effort Syndication
- The Architecture of Collaboration

'Web 2.0' – by Marketing Cliché

A way of thought, rather than a technology:

- 'The world has changed' (get with it)
- 'Loosen up' (you can't control)
- 'Open up' (you can't stay closed)
- 'Be accessible' (not just web-browsers)
- 'Involve' (get users on the inside)
- 'Mutate' (continuous improvement' / 'gamma'; or is that just an excuse for 'permanent beta'?)

'Syndication'

- Originally, a 'syndicate' was **a group of investors**, cf. a joint venture
- More recently, **a means of distribution** esp. of media material e.g. sports photos, cartoons, and opinions by commentators
- Recently, arrangements by which **a party that originates content**
 - (a) **licenses others to utilise it, and**
 - (b) **facilitates dissemination of copies of it, and of metadata about it**

'Content Syndication'

- Posts to Usenet News, Fora, eMail-Lists
- Personalised eNewspapers (originally by fax, then email, ...)
- eMail Notification when a web-page changes
- Mirrors of web-page content
- 'Web-Logs' / 'Blogs'
- 'Who I'm Reading' feature of blogs
- '**Feeds**' of recently-published headlines & URLs using XML/RDF-based RSS and Atom



'Advertising Syndication'

- Overture (2001)
- Google AdWords
- From 'Pay-per-ad' (per insert/appearance)
- To 'Pay-per-click' (per click on an ad):
 - Advertisers use metadata ('keywords') to indicate what the ad is about
 - They do pay to use a keyword
 - They don't pay for an ad display
 - They do pay when someone clicks on it



'The Architecture of Participation' aka 'Harnessing Collective Intelligence' and 'The Surging Wisdom of Crowds'

- **Self-Publishing** / 'Vanity Press'
Now called 'Content Syndication'
- **Collaborative Publishing:**
cf. CSCW – shared text-documents
Wikis generally, esp. Wikipedia
- **Free-Text Metadata:**
'folksonomy', 'tags', 'tag-clouds'

The Communitarian Perspective: An Architecture of Collaboration?

- **Wikipedia**
 - a reference repository
 - collaborative authorship
- **Flickr:**
 - a photo repository
 - free-text meta-tags
 - hence a 'folksonomy' (cf. taxonomy)
 - hence 'tag-clouds' (word-size in display proportional to frequency)
- **Del.icio.us:**
 - a bookmark repository
 - with free-text meta-tags
 - on to 'folksonomy' and tag-clouds
- **YouTube:**
 - a video repository
 - on to ...
 - ...



5. Mobile Devices

'Any device that provides users with the capacity to participate in Transactions with Adjacent and Remote devices by Wireless Means'

- **Mobiles / Smartphones**
- **Handheld Computing Devices**
PDAs, games machines, music-players, 'converged' / multi-function devices,
Tablets esp. iPad but now many followers

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- **Processing Capabilities in Other 'Form Factors'**
Credit-cards, RFID tags, subcutaneous chips
- **Wearable Computing Devices**
Watches, finger-rings, key-rings, glasses, necklaces, bracelets, anklets, body-piercings
- **? Nomadic / Untethered PCs**

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 - 1G – Analogue Cellular, e.g. AMPS, TACS
 - 2G – Digital Cellular, e.g. GSM, CDMA
 - 3G – GSM/GPRS/EDGE, CDMA2000, UMTS/HSPA
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- Personal Area Networks (1-10 metres) – Bluetooth? Infra-red?
- Contactless Cards / RFID Tags / NFC Chips (1-10cm radius)

Mobile means Variable-Location Not Fixed-Point

- [Faxes for printouts, Phones for spoken email]
- Wifi / iBurst / WiMax wireless connection
- 3G cellular services (GSM/GPRS, CDMA2000, UMTS/HSPA) to an Internet Access Provider (IAP)
- Provides a temporary IP-address
- The device is inherently locatable to the cell that it's in
- Potentially more accurately locatable (MOLI, transceiver direction, signal analysis, triangulation, GPS self-reporting)
- May involve one or multiple 'nyms' (IMSI)
- Used in some circumstances by fixed-location devices e.g. in sparsely-populated regions, and to try to hide

Mobile means Device - in - Motion

Mobile means Device - in - Motion Device, Channel Capacity and Stability Issues

- **Mobile Device Capacity Constraints**
(processor, memory, storage, display, power)
e.g. may be unable to support web-browsers
- **Bandwidth Constraints**, partly inherent,
partly because of web-designers' ignorance,
excessive enthusiasm, inadequate self-discipline
- **Mobile Phone Handoff between cells is poor**
- **Internet Handoff is worse.** When a device
moves to a new sub-net, it loses its IP-Address
and has to get a new one from its new sub-net

A Solution to the Device-in-Motion Problem

'Mobile IP' Re-direction

- **Messages are directed to a specific, stable IP-Address**
(which could be thought of as a 'care-of' address)
- **A home agent on the home subnet of the mobile device performs re-direction of the traffic**
- Sending nodes only ever send to the home IP-Address
- There is a delay in the notification by the device of a new IP-Address, so messages in the interim need to be managed
- Is implementation proceeding quickly enough?

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