COMP 3410 – I.T. in Electronic Commerce

eTrading 2
Technologies Underlying eTrading

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http://www.rogerclarke.com/EC/ ...
{ETIntro.html#L2, OhdsET2.ppt}

ANU RSCS, 4 September 2012

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E-Trading
Technologies Underlying eTrading

Agenda

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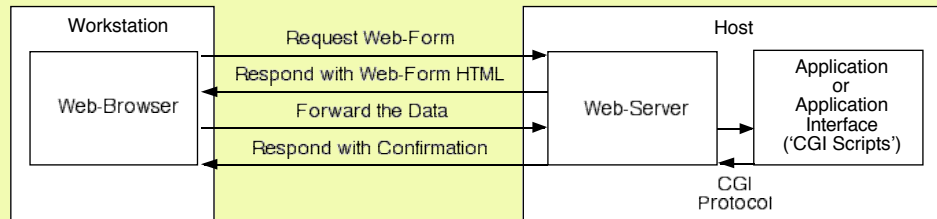5. Mobile Technologies
   - Devices
   - Wireless Comms

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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

http://www.rogerclarke.com/II/WCBirth.html

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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

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Web-Form Processing

Workstation		Host	
Web-Browser	→ Request Web-Form →	Web-Server	Application or Application Interface ('CGI Scripts')
	← Respond with Web-Form HTML ←		
	→ Forward the Data →		
	← Respond with Confirmation ←		
		CGI Protocol	

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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**

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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)
- Examples include:
  - IBM WebSphere
  - BEA WebLogic
  - Tomcat (open source)
  - Allaire JRun
  - Oracle Application Server
  - Microsoft Commerce Server

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2.   Shopping Carts

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

http://www.rogerclarke.com/EC/ShoppingCart.html
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Slide 9

Quantity	Product		Availability	Price	☑ Inc. GST
1 Remove	105L	Samsung Samsung MLT-D105L - Black	DELIVERY: Usually ships same business day. Availability BUSINESS CENTRE PICKUP: Available at North Ryde Business Centre (NSW) . Availability OSBORNE PARK (WA): Pre-Paid pick up only FYSHWICK (ACT): Pre-Paid pick up only HAWTHORN EAST (VIC): Pre-Paid pick up only	$111	

UPDATE

Sub Total $111.00

Promo Code   [ ]   Update

Some discounts may be applied at the time of processing your order and will be shown on your invoice.

Understanding Delivery

Delivery usually takes 3 – 4 business days (Monday to Friday, excluding public holidays) provided all products are in stock. If you require Same Day or Express delivery please place you order online as normal, then phone 1300 13 9999 and quote your Order Reference Number.

Delivery based on this postcode: [ ]   Update

Delivery Total* $--

* This figure is for estimate purposes only. The final fee will be displayed after delivery address is finalised.

Order Total $111.00

Harris Technology – http://www.ht.com.au/cart.hts
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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

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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

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3.   Server Control of the Browser

- Java Applets
- ActiveX Controls
- 'Asynchronous JavaScript and XML' (AJaX)
- HTML5

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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

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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'

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'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**

http://www.rogerclarke.com/EC/Web2C.html#AltT

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HTML5

- A version beyond 1.0, 2.0, 3.2, 4.01, ...
- A way to support:
  - multi-media streaming
  - open channels as well as sessions
  - geolocation support
- A way to subvert sandboxing
- A way to subvert user control, by inverting the Web from pull to push
- A way to access local data and devices (e.g. cameras, microphones), giving rise to "A Pandora's box of tracking in the Internet"

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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 <u>do</u> pay to use a keyword
  - They <u>don't</u> pay for an ad display
  - They <u>do</u> pay when someone clicks on it

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'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'

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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 ...
- **...**

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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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  'converged' / multi-function devices,
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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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5.   Wireless Comms

- **Wide** Area Networks – **Satellite** (Geosynch; Low-Orbit)
  GS is Large footprint, very high latency (c. 2 secs)

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  and proprietary options such as **iBurst**

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- **Wide** Area Networks – **Cellular** (50m to 10km cell-radius,
  with increasing capacity per user, particularly 3G onwards)
  1G – Analogue Cellular, e.g. AMPS, TACS
  2G – Digital Cellular, e.g. GSM, CDMA
  3G – GSM/GPRS/EDGE, CDMA2000, UMTS/HSPA
  4G – LTE, with preliminary versions imminent

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  - 4G – LTE, with preliminary versions imminent
- **Local** Area Networks – **'WiFi'** (10-100 m radius)
  primarily IEEE **802.11x, where x=a,b,g,n**

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- **Personal** Area Networks (1-10 metres) – Bluetooth? Infra-red?
- **Contactless Cards / RFID Tags / NFC Chips** (1-10cm radius)

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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' (IMSIs)
- Used in some circumstances by fixed-location devices e.g. in sparsely-populated regions, and to try to hide

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Mobile means Device - in - Motion

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Mobile means <u>Device - in - Motion</u>
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

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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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