SOA and Web 2.0

Understanding the terms and what it means for the mainframe professional

Eric L. Vaughan

illustro
See The Light.

Copy of illustro Presentations

- http://www.illustro.com/conferences

WAVV2006-2

illustro
See The Light.

Topics

- XML and Web Services
- SOA
  - Origins
  - Definition
  - Practical implications
- Web 2.0
  - Origins
  - Definition
  - Practical Implications
- Resources for Mainframers

WAVV2006-3

illustro
SYSTEMS INTERNATIONAL, LLC
See The Light.

What is XML?

- A World-Wide Web Consortium (W3C) standard for structured text
- A language tool that provides a way to give more intelligence to data
- A technology which provides significant benefits for adopting organizations

Copyright © 2006 illustro Systems International, LLC   WAVV2006-4

What is XML?

www.w3c.org/xml

Copyright © 2006 illustro Systems International, LLC   WAVV2006-5

Benefits Offered by XML

- Open design standards
- Non-proprietary definition
- Part of the "computing democracy""
- Allows information reuse
- Improved lifecycle management
- Increased availability of enterprise information
- Locate and deliver information efficiently
- Configurable information appearance

Copyright © 2006 illustro Systems International, LLC   WAVV2006-6

How Does XML Do This?

- XML is platform-independent
- Data structure can be designed to support any organizational goals or requirements
- XML does not care what tools or processes you apply to your information
- XML abstracts content and structure and makes them visible to automated processes
- XML provides structured markup for documents and other information

Structure Without Style

- XML documents do not carry formatting information inside them
- To specify how to render an XML document, you need to specify style information
- Two competing approaches
  - XSLT: eXtensible Stylesheet Language
  - CSS: Cascading Style Sheets
- Both are W3C standards

XML Harmonizes Disparate Data Sources

- User can view and manipulate data coming from varying storage types
- XML acts as common interface between users and datastore content
  - eliminates need to maintain multiple tools
  - makes data interoperable on client side

Definitions of a Web Service

- A Web service is a software system designed to support interoperable machine-to-machine interaction over a network.
- It has an interface described in a machine-process able format (specifically WSDL).
- Other systems interact with the Web service in a manner prescribed by its description using SOAP-messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.

Definitions of a Web Service

- Some kind of function you can use across some kind of network
  - Usually involve short interactions (connect, access code, disconnect)
  - Discoverable, maybe ...
  - Described with XML

- A Web Service is the exposure of a business process over a network

Web Services as "MiddleWare"

"CLEARLY, THE ISSUE OF MIDDLEWARE NEEDS TO BE ADDRESSED AS SOON AS POSSIBLE."

Web Services…

http://www.w3.org/2002/ws/arch/

Behind the Technology

- XML
  - EVERYTHING is in XML
- SOAP
  - Simple Object Access Protocol
  - Protocol to make requests and receive result
- WSDL
  - Web Service Description Language
  - Describes the available services, inputs and outputs

Behind the Technology

- UDDI
  - Universal Description, Discovery and Integration
  - Data base of available services (gets you to the WSDL)
  - API to search and update the data base

Data Transports

- Web Service protocols do not define the physical (wire) or logical (application layer) protocol used to transmit requests and results
- Typically the TCP/IP protocols used are
  - SMTP
  - HTTP

Data Transports

- Simple Mail Transfer Protocol (SMTP)
  - Early TCP/IP protocol
  - Multipurpose Internet Mail Extensions (MIME) support allows non-textual data
- Problems with SMTP
  - Non-textual data must be encrypted
  - Security problems
  - Data size limitations

Data Transports

- Hypertext Transfer Protocol (HTTP)
  - Most used protocol for Web Services
  - Newer protocol (1990s)
  - Supports binary data
  - Request headers more extensible
  - Request/response model
- Other protocols are possible
  - Internet Inter-ORB Protocol (IIOP)
  - IBM MQSeries

Web Services Discovery

- One of the most powerful concepts of Web Services is services discovery
- All of the key pieces of information to be given to the SOAP client can be given at runtime
- Quick example of how SOAP, UDDI and WSDL work together

SOA

"Things should be made as simple as possible, but no simpler." -- Albert Einstein

SOA…

- **S**ervice **O**riented **A**rchitecture
- An evolving process to connect beyond the wire
  - Applications
  - Data
- Billions of lines of code have been developed over the last 4 decades
  - Proven, still valid applications
  - Infrastructure so entrenched, change is not feasible
- Data is in multiple formats, and impossible to map in a consolidated dictionary

SOA…

- TCP/IP became a common denominator which gave us general connectivity
- Mass migrations have proven unrealistic
- Data Warehousing also unrealistic--- instead, more of a data and application mall
- Applications are just as important as the Data

SOA…

- Not a product
  - Although many products being offered in the space
- Not owned by anyone—an open, evolving standard
- Object is to create an ability to reuse across the enterprise

SOA…

- Important concept of "loosely coupled"
- "Real dependencies" versus artificial dependencies
  - Example of power and power adapters
    - The real dependency is power
    - The artificial dependency are power adapters
- To reduce artificial dependencies to the minimum=loose coupling

SOA…

- Goal of SOA is to achieve loose-coupling among interacting software agents
- TCP/IP is a great example of where that was accomplished
- Service providers and service consumers
- Why do this?
  - Good software has already been written
  - Not experts in everything
  - Reuse continues to return on original investment
  - "There's really no new code, only new languages?"

SOA…

- How SOA achieves loose-coupling
  - Two architectural constraints
    - Small set of simple and ubiquitous interfaces to all participating software agents. Only generic semantics are encoded at the interfaces. The interfaces should be universally available for all providers and consumers.
    - Descriptive messages constrained by an extensible schema delivered through the interfaces. No, or only minimal, system behavior is prescribed by messages. A schema limits the vocabulary and structure of messages. An extensible schema allows new versions of services to be introduced without breaking existing services.
- If interfaces do not work, services do not work

SOA…

- Before an architecture can be considered service-oriented:
  - First, the messages must be descriptive, rather than instructive, because the service provider is responsible for solving the problem.
  - Limiting the vocabulary and structure of messages is a necessity for any efficient communication.
  - Third, extensibility is vitally important. Changes demand corresponding changes in the software system, service consumers, providers, and the messages they exchange.
  - Fourth, an SOA must have a mechanism that enables a consumer to discover a service provider under the context of a service sought by the consumer.

SOA "Defined"

- No official body "in charge"
- Subject to interpretation
- OASIS (Organization for the Advancement of Structured Information Standards) trying to bring some substance and clarity to the definition

Illustro
See The Light.

SOA "Defined"

http://www.oasis-open.org/committees/tc_cat.php?cat=soa

Illustro
See The Light.

SOA "Defined"...

- Generally accepted that a Web service is a SOA with at least the following additional constraints:
  - Interfaces must be based on Internet protocols such as HTTP, FTP, and SMTP.
  - Except for binary data attachment, messages must be in XML.

Illustro
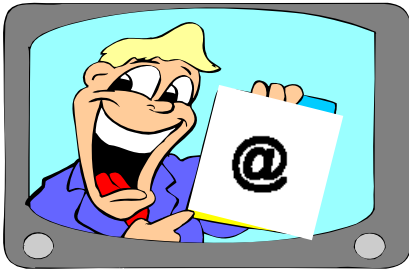See The Light.

SOA – Summary

- Uses XML
- Employs Web Services
- Idea is to create "loosely-coupled" services, that can function as provider and requestor
- Ability to reuse applications and data without conversion, migration or re-engineering
- Continuing to evolve, and rapidly

Web 2.0

Web 2.0…

- Phrase coined by Tim O'Reilly (www.oreillynet.com) at an industry conference
  - Web 2.0 Conference
  - 9.5 million citations in Google
- General term to describe new experience on the Web
- No substantive definition—but loosely referring to difference between static Web sites and dynamic, interactive sites
- Substantial discord over the term

Web 2.0…

- 7 "Principles"
  - The Web as Platform – Netscape vs. Google
    - No distributed software, rather delivered service
    - Constantly updated (eternal Beta)
    - Browser, Servers are just tools, the platform gives the value
  - Harnessing Collective Intelligence
    - Hyperlinking connects – like synapses in the brain
    - Catalogs and directory of links
    - Growing organically: eBay, MySpace
    - User engagement: Amazon

illustro
See The Light.

Copyright © 2006 illustro Systems International, LLC   WAVV2006-34

Web 2.0…

- Blogging and the Wisdom of Crowds
  - Dynamic pages encourage group discussion
  - RSS feeds deliver content from the Internet without a browser
  - In the "blogosphere" everyone gets to comment (not just the media)
- Data is the next Intel Inside
  - Owning data gives tremendous leverage
  - Mapquest (Navteq) vs. Amazon   NAVTEQ

illustro
See The Light.

Copyright © 2006 illustro Systems International, LLC   WAVV2006-35

Web 2.0..

- End of the Software Release Cycle
  - Data is available as a service, not as a product
  - Focus on operations
  - The perpetual beta
  - Flickr says they roll out new builds sometimes every half hour
- Lightweight programming model
  - Design to be hacked
  - Simplicity fosters community adoption and enhancement

illustro
See The Light.

Copyright © 2006 illustro Systems International, LLC   WAVV2006-36

illustro
SYSTEMS INTERNATIONAL, LLC
See The Light.

Web 2.0…

- Software above the level of a single device
  - Design solutions that are usable in a variety of ways, and include multiple "devices"
  - iTunes as an example – Back end server—local PC—handheld device
- Rich user experiences
  - Flash one of the earliest experiences
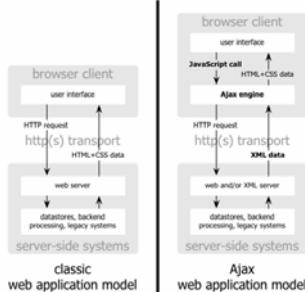 - AJAX technology

AJAX Technology

- Asynchronous Javascript and XML
- Term coined by Jesse James Garrett of Adaptive Path
- Delivers desktop application functionality from a browser
- Microsoft jumped in with March 2006 announcement of Atlas

AJAX Technology…

AJAX Technology…

classic web application model (synchronous)

Ajax web application model (asynchronous)

Copyright © 2006 illustro Systems International, LLC   WAVV2006-40

AJAX Technology…

http://maps.google.com

WAVV2006-41

AJAX Technology…

www.zimbra.com

Copyright © 2006 illustro Systems International, LLC   WAVV2006-42
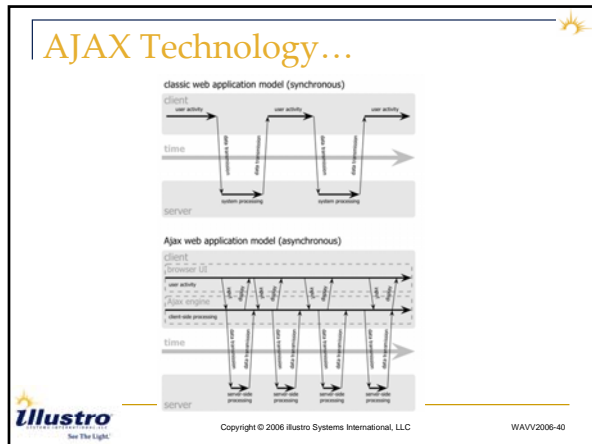
AJAX Technology…

www.illustro.com/zwebhost.htm

Web 2.0

Source: oreillynet.com

Other "Web 2.0" Sites and Services

- www.flickr.com
- www.wikipedia.org
- del.icio.us
- www.bittorent.com
- www.ebay.com
- www.amazon.com

Just a sampling…

VSE and Mainframe Resources

- VSE/ESA 2.7 and z/VSE 3.1 – Part of the VSE Connectors
  - SOAP Server/Client
    - SOAP Server allows CICS programs to be called as a Web Service from any SOAP-enabled platform
    - SOAP Client can be used by a CICS program to invoke a Web Service on another SOAP-enabled platform
    - Implemented as a CICS program using CWS
  - XMLAPI
    - Callable by CICS or batch programs
    - Provides creation or parsing of XML documents
- Concepts can be implemented simply by using the protocols and "standards"
- z/Web-Host and z/XML-Host

More Reading and Resources

- illustro's new Class – "Connecting VSE to the World"
  - www.illustro.com/education.htm
- XML
  - www.w3c.org/XML
  - www.xml.com
- SOAP
  - www.w3c.org/TR/soap
- WSDL
  - www.w3c.org/TR/wsdl
- UDDI
  - www.uddi.org
- z/VSE Connector Info
  - http://www-1.ibm.com/servers/eserver/zseries/zvse/products/connectors.html
- illustro's z/Web 2.0
  - www.illustro.com/zwebhost.htm
- illustro's z/XML-Host
  - www.illustro.com/zxmlhost.htm