



WAVV 2005
Colorado Springs, CO

XML and Web Services for **DUMMIES**

Why Do I Care?

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illustro Education

- Members of the illustro team have a long history of educating the VSE community on emerging standards
 - BTAM to VTAM
 - TCP/IP education and implementation before Connectivity Systems had a product (OpenConnect product)
 - HTTP, Web and Internet connectivity
 - CICS Transaction Server
 - New Class -- Connecting VSE to the World
 - ...and now, a new technology: XML and Web Services

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Agenda

- Evolution of Web Services
- XML Basics
- Web Services Basics
- Mainframe resources
- Additional information and resources



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Why Are We Here?


- Vendor race to define "the" standard that all will use
 - Database
 - Programming language
 - Interface
 - Operating System
- All solutions by definition are proprietary

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The Problem with Proprietary

- The Evil Empire (whichever one) dictates all we do
- Decisions made in a vacuum, drunk on their own wine
- When dominance is achieved, there's no room for negotiation
- HOSTAGE!



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Evolution of Web Services

- Evolved from distributed computing
- Computing models changed
 - Mainframe – all centralized
 - Advent of PCs and local networks
 - Early 1990s object frameworks emerged
 - Component Object Model (COM) – Microsoft
 - Common Object Request Broker Architecture (CORBA) from the OMG



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Evolution of Web Services...

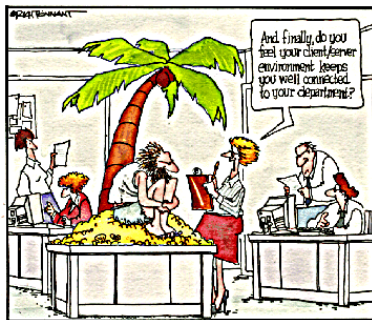
- Both COM and CORBA were models for encapsulating objects that can be called in a standard way from any application that supports either one
- COM and CORBA were not interoperable; one or the other
- Still islands of data



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Islands of Data!



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Evolution of Web Services...

- In the 1990s as LANS continued to multiply, new standards were developed for extending these frameworks across networks
 - OMG – Internet Inter-ORB Protocol (IIOP)
 - Microsoft – Distributed COM (DCOM)
 - Sun – Remote Method Invocation (RMI) for Java
- Using Remote Procedure Call (RPC), components call components across the network
 - But only within the component architecture—not interoperable



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Evolution of Web Services...

- CORBA/IIOP and DCOM are both “Stateful” architectures
 - Server must hold state information, such as the callers address, longer than just a single request and reply
 - Connection oriented
- In “Stateless” architectures, server does not require connections longer than a single request/response
- 3270 Session – Stateful
- HTTP-Browser – Stateless



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Evolution of Web Services...

- These protocols also work synchronously
 - Other side must be available
 - Conversation must take place when initiated
- Asynchronous means one-way messages can be sent, acted upon when the service is available
 - IBM's MQSeries
 - Microsoft Message Queuing (MSMQ)



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Evolution of Web Services...

- Applications work well within similar networks, and same architectures
- Many cases they are tied to vendor definitions—DCOM Windows, CORBA/IIOP-Java
- Advent of Internet made the “network” extremely large and decentralized
- Synchronous, stateful interactions aren’t feasible



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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

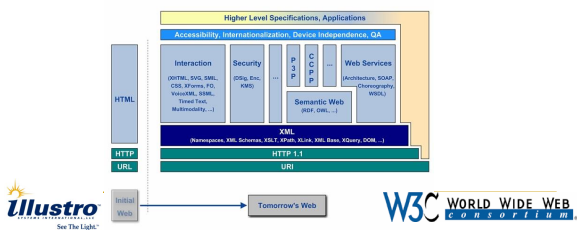


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eXtensible Markup Language

- Derivative of ISO’s SGML
- Created by a working group of the W3C
- XML 1.0 released in February 1998
- XML 1.1 released in February 2004



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



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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



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What is Structured Markup?

- Technique for encoding documents according to structure and content
- Strategy to make document content available to sophisticated processes
- Mechanism for labeling document components and organizing them hierarchically



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Structure, Format and Content

- Documents contain two kinds of information
 - Format and content
- Format provides clues to structure
 - Helps end users understand the document
 - Provides a framework for the content



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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



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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





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XML Basics

- Some terms and concepts
 - Tag: the markup used to enclose an element's content. A non-empty tag has an opening and closing tag: `<xxxx> </xxxx>`
 - Element: a section of a document defined by start and end tags (or an empty tag), including any associated content
`<Panel-Id>IESADMSL.IESEADM</Panel-Id>`
 - Attribute: a property associated with an XML element that's also a named characteristic of the element `<Option num="1">Installation</Option>`

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XML Basics...

- Some terms and concepts
 - Nesting: ordering of elements whereby a child element is opened and closed before the parent is closed
`<Options>
 <Option num="1">Installation</Option>
</Options>`
 - Well-formed: the XML document adheres to the syntax rules
 - Parser: program or service that validates the structure of the XML document

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A Well-formed XML Document

```
<?xml version="1.0" standalone="yes" encoding="UTF-8"?>
<!-- Generated by z/XML-Host, Copyright 2005 illustro Systems
International, LLC -->
<Screen>
  <Panel-Id>IESADMSL.IESEADM</Panel-Id>
  <Title>
    VSE/ESA FUNCTION SELECTION
  </Title>
  <APPLID>DBDCCICS</APPLID>
  <Options>
    <Option num="1">Installation</Option>
    <Option num="2">Resource Definition</Option>
    <Option num="3">Operations</Option>
    <Option num="4">Problem Handling</Option>
    <Option num="5">Program Development</Option>
    <Option num="6">Command Mode</Option>
    <Option num="7">CICS-Supplied Transactions</Option>
  </Options>
  <Keys>
    <Key Desc="Help">PF1</Key>
    <Key Desc="SIGN OFF">PF3</Key>
    <Key Desc="Escape (U)">PF6</Key>
    <Key Desc="Escape (m)">PF9</Key>
  </Keys>
</Screen>
```

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XML Basics...

- Reason it works so well is all "partner" systems agree on the markup content
- A "map" is used to specify the particulars
 - Document Type Definitions (DTDs) and Schemas
 - Both specify how a documents elements work together to create a specific structure
 - Many different industry defined Schemas
 - You can create your own for intra-development
- XML Document processor uses the Schemas to validate the document



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What are Web Services?

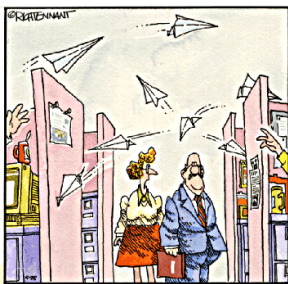
- A new component model
- Stateless and asynchronous in design
- A way to leverage XML and the power of the Web
- The latest and greatest attempt at interoperability
- A new way to develop applications



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Web Services as "MiddleWare"



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



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Three Key Standards

- SOAP – Simple Object Access Protocol
- WSDL – Web Services Description Language
- UDDI – Universal Description, Discovery and Integration Protocol



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3 Key Standards - SOAP

- A protocol for accessing remote objects using XML
- Does NOT define:
 - Which operating system to use
 - Which programming language to use
 - Which object model to use
 - Which wire protocol to use (HTTP, FTP, SMTP etc.)



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SOAP...

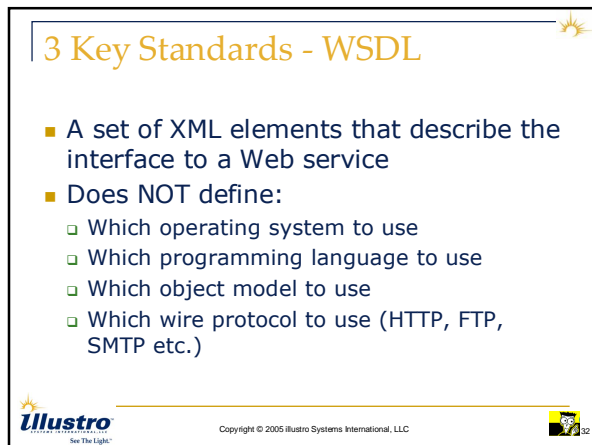
- SOAP 1.1 defined:
 - An XML envelope for XML messaging
 - Headers + body
 - An HTTP binding for SOAP messaging
 - SOAP is "transport independent"
 - A convention for doing RPC
 - An XML serialization format for structured data
- SOAP Attachments adds
 - How to carry and reference data attachments using a MIME envelope and a SOAP envelope

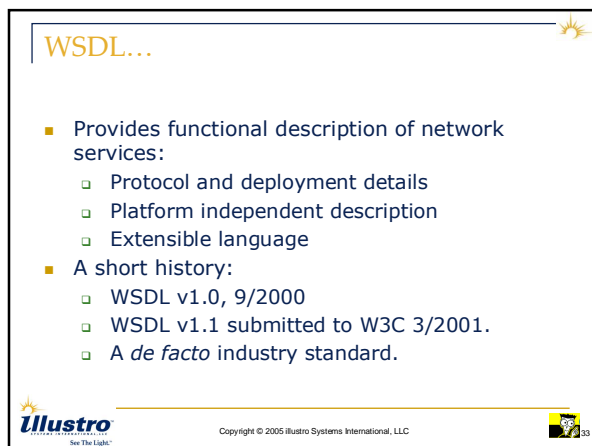


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Using WSDL

- Allows industries to define standardized service interfaces
- Allows advertisement of service descriptions, enables dynamic discovery and binding of compatible services
 - Used in conjunction with UDDI registry
- Provides a normalized description of heterogeneous applications



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3 Key Standards – UDDI

- A set of XML elements that describe how to query, insert, update, or delete elements in a Web services registry
- Does NOT define:
 - Which operating system to use
 - Which programming language to use
 - Which object model to use
 - Which wire protocol to use (HTTP, FTP, SMTP etc.)



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Using UDDI

- UDDI defines the operation of a service registry:
 - Data structures for registering
 - Businesses
 - Technical specifications
 - Service and service endpoints
 - SOAP Access API
 - Rules for the operation of a global registry
 - "private" UDDI nodes are likely to appear, though
 - Everything that goes into or comes out of a registry is in XML
 - All communication with a UDDI registry is done through SOAP calls



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Web Services Discovery



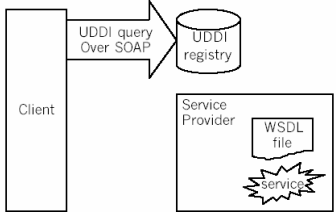
- One of the most powerful concepts of Web Services is services discovery
- All of the key pieces of information to be given to the SOAP client can be given at runtime
- Quick example of how SOAP, UDDI and WSDL work together

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Web Services Discovery...



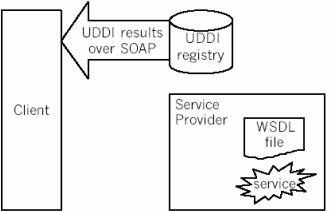
Step 1. The client queries the UDDI registry for a service

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Web Services Discovery...

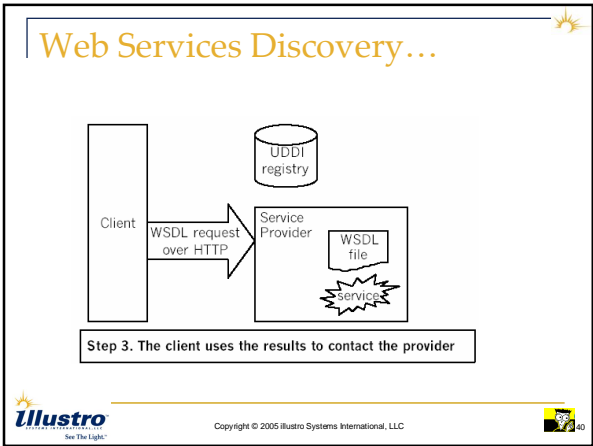


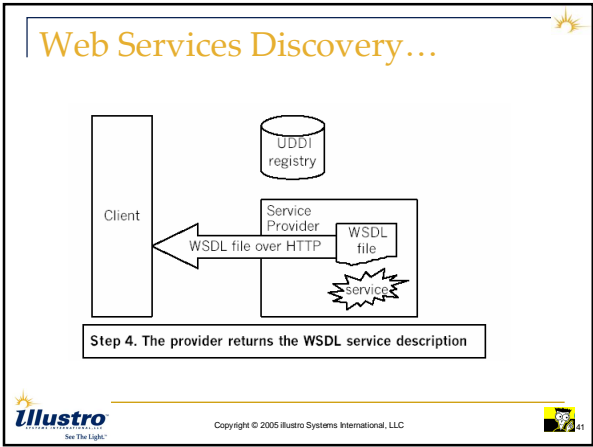
Step 2. The UDDI registry sends the query results back

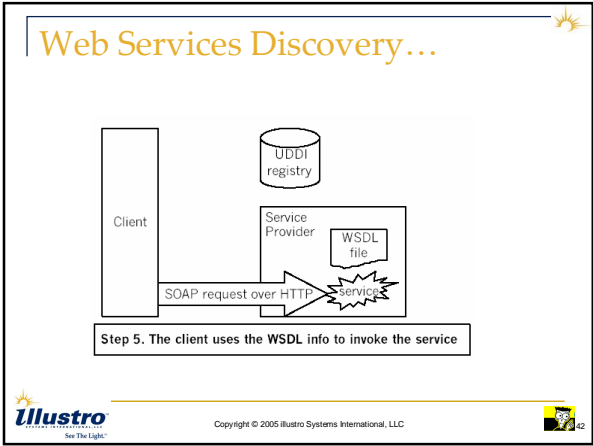
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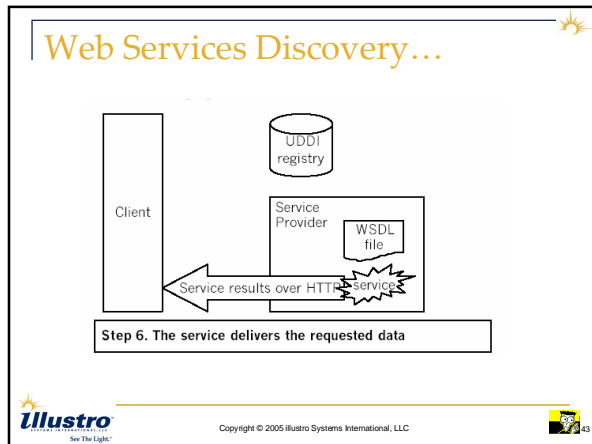
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Web Services Are Different

- You can:
 - Use any Operating System
 - Use any programming language
 - Use XML to represent data universally
 - Dynamically discover and invoke components at runtime

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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
- For z/VSE-VSE/ESA and z/OS-OS/390

```
<Software>  
  <Self Promotion>  
    illustro's z/XML-Host  
  </Self Promotion>  
</Software>
```

Come to the Expo to see a Microsoft Excel Spreadsheet interact with a VSE-CICS-VSAM program, retrieve and update data

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Summary – Why Do You Care?

- May start on your Intranet
 - Discover the benefits of platform/database/language independence, they may start sharing with customers, vendors, suppliers and partners
- Incredible chance for success
 - Open standard
 - Non-proprietary
 - Same type of revolution that TCP/IP brought
- You can go back and tell your team that you know how to tie in Java, .Net, Microsoft Office, (any Web Services ADE) to your mainframe data and applications



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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/XML-Host
 - www.illustro.com/zxmlhost.htm



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Even More Information!

■ XML and Web Services 201 – Chuck Arney

□ Monday at 10:30 a.m. in Gold Camp Room

■ .Net Programming Example with VSe

□ Monday at 3:00 p.m. in Gold Camp room

