

Learning Management Systems XML and Web Services

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Agenda

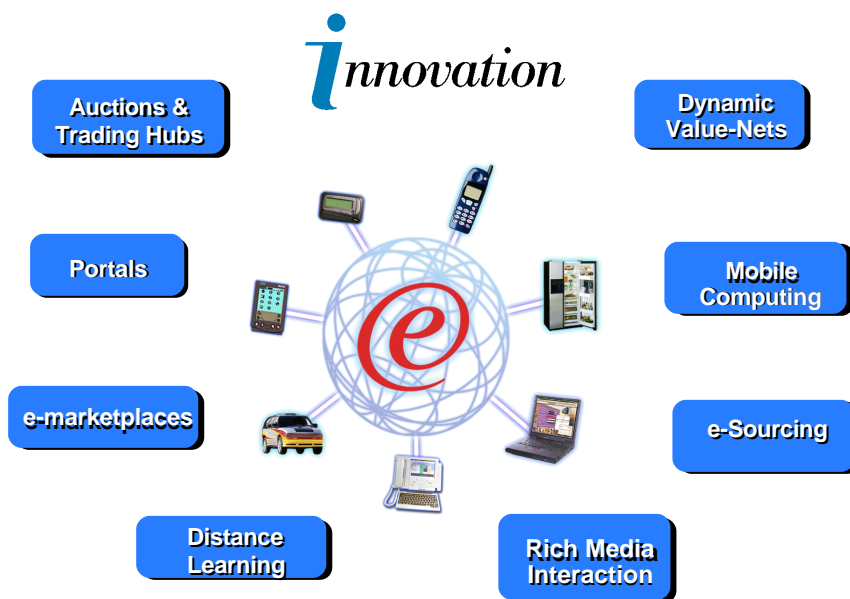
- Positioning of XML and Web Services
- What is XML?
- XML and Presentation
- XML and Storage
- Web Services Integration
- IBM and Web Services
- Learning Management Systems, xml and Web Services
- IBM Learning Management System



Positioning of xml and Web Services



The Next Generation of e-business



New Technologies are Driving New, Innovative Business Model



Open Standards Unlock Opportunity



"Proprietary standards often lock solution providers and their customers into one vendor's technology. Open standards allow for the use of technology from many different vendors."

CRN, 2001/2/23
Open Standards Unlock Opportunity



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Web Application Integration Evolved



Applications which interact with each other using Web standards

Pre-1990s
Custom static apps integration

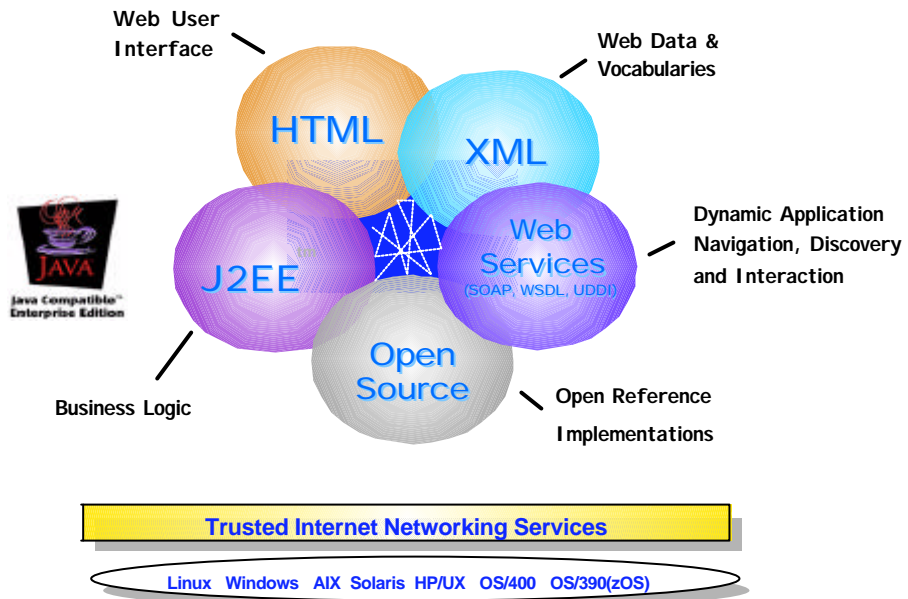
Early 1990s
Application integration standards appear
e.g., EDI

Late 1990s
Web standards appear e.g., HTTP, HTML, XML, OBI, Rosetta Net, cXML

2000+
Web application standards = Web Services

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IBM WebSphere as an Open Standards Platform



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Learning Management Systems, XML and Web Services

What is XML?

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XML - eXtended Markup Language

■ Markup Language

- ▶ syntax for defining markup: elements and attributes
- ▶ Example: `<order id="X120344" customerRef="C10045">`

■ Extended

- ▶ Can be extended with custom tags and attributes
- ▶ More flexible and customizable compared to html
- ▶ html is a fixed set of elements and attributes
- ▶ all types of information had to go through the html format
- ▶ Easy to use. (Down-sized version of SGML)

■ Object oriented

- ▶ XML builds hierarchical object structures defined in Document Type Definitions DTD or XML Schemas
- ▶ Focus on data not presentation
- ▶ Integrates content and meta-information about content

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Example - XML Source File

```
<?xml version="1.0" encoding="utf-8" ?>
<FilmML>
  <Film>
    <OriginalTitel>Olsen Banden</OriginalTitel>
    <Instruktør>Erik Bølling</Instruktør>
    <Premiere>11. Oktober 1968</Premiere>
    <Plakat src="olsen_banden.jpg" />
    <Anmeldelse>Der er masser af festlige påfund i filmen, men alligevel løber den et par gange løbsk og præsenterer tomgang, fordi man har taget en masse ideer med, som ikke udnyttes til bunds, men til sidst hænger og flagerer som løse tråde i en historie, der lykkeligvis udvides til det glæde vænvid med slutningen. Der får Olsen Banden utvivlsomt sin succes.</Anmeldelse>
  </Film>
  <Rolle>
    <Skuespiller>Ove Sprogø</Skuespiller>
    <Rollenavn>Egon Olsen</Rollenavn>
  </Rolle>
  <Rolle>
    <Skuespiller>Morten Grundwald</Skuespiller>
    <Rollenavn>Benny</Rollenavn>
  </Rolle>
  <Rolle>
    <Skuespiller>Paul Bundgaard</Skuespiller>
    <Rollenavn>Kjeld</Rollenavn>
  </Rolle>
  <Rolle>
    <Skuespiller>Kirsten Walther</Skuespiller>
    <Rollenavn>Yvonne</Rollenavn>
  </Rolle>
  <Rolle>
    <Skuespiller>Jes Holtzø</Skuespiller>
    <Rollenavn>Børge</Rollenavn>
  </Rolle>
</FilmML>
```

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XML and Presentation



Separating Content from Presentation

- XML separates content from presentation
 - ▶ Reuse of content
 - ▶ Presentation can be changed
 - ▶ Presentation on different media (mobile devices, TV, paper,..)
 - ▶ XML adds object oriented structure and meaning to content
- XML needs to be presented to users
 - ▶ not meant to be read by humans
 - ▶ requires a transformation to presentation formats
 - ◆ e.g. HTML, WML, PDF and RTF
 - ▶ supports different users using different devices



Example - XML Source File



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  </Rolle>
</FilmML>
```

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Example - Different Presentations of Source



The screenshot shows two windows of Internet Explorer. The left window displays the XML source code for 'Olsen Banden', including the title, director, premiere date, and a list of actors and their roles. The right window shows the rendered HTML output of the XML. It features a title 'Olsen Banden', the director 'Erik Bølling', and the premiere date '11. Oktober 1968'. Below this is a paragraph of text describing the film, followed by a poster image for 'Olsen Banden'. At the bottom, there is a table listing the actors and their roles.

| Skuespiller | Rollenavn |
|------------------|------------|
| Ove Sprogø | Egon Olsen |
| Morten Grundwald | Benny |
| Poul Bundgaard | Kjeld |
| Kirsten Walther | Yvonne |
| Jes Holtzø | Børge |

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XML and Storage



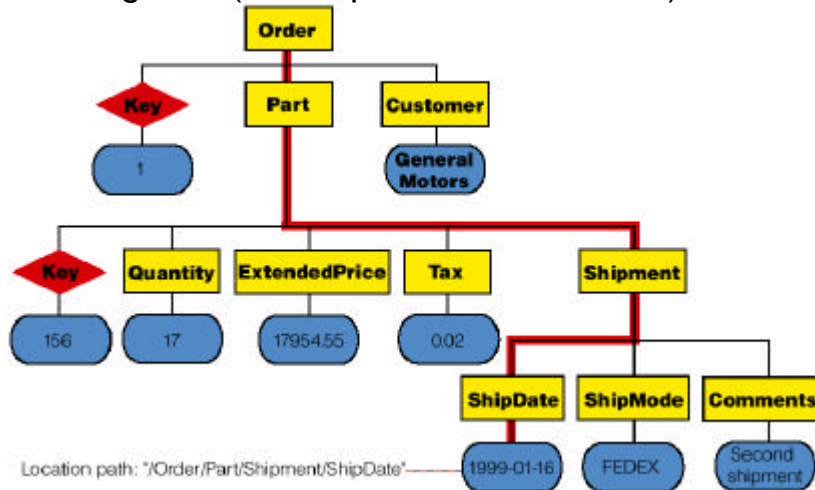
Storage Requirements

- Storing XML documents
 - ▶ Storing a complete XML document
 - ▶ Storing fragments of a XML document (elements and attributes)
 - ▶ Standardized commands for storing XML
- Retrieving XML documents
 - ▶ Retrieving complete XML documents
 - ▶ Retrieving fragments of a XML document
 - ▶ Standardized commands for retrieving XML
 - ▶ Indexing of elements, attributes and content for fast retrieval
- Managing XML documents
 - ▶ Storage and handling of XML DTDs or Schemes
 - ▶ XML data integrity, security, recoverability and manageability.



Using XML xpath in Queries

- Local path identifies elements or values in XML data
 - ▶ Location Path: "Order/Part/Shipment/ShipDate"
 - ▶ As search criteria (find orders where ShipDate = 1999-01-16)
 - ▶ As result fragment (return Shipdate for my order)
 - ▶ To update fragment (set ShipDate = 1999-01-17)



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Learning Management Systems, XML and Web Services

Web Services Integration on the Internet

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Dynamic E-business



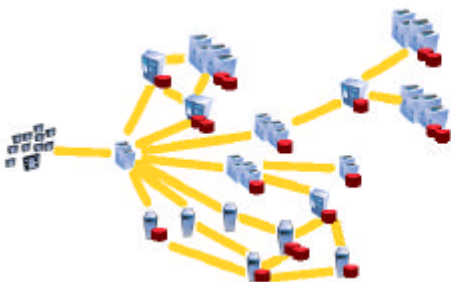
- By bringing new simplicity and flexibility to integration
Web services architecture enables dynamic e-business
- business value locked in a company's systems
can easily be incorporated into any business application
or process
- without regard to platform or programming language

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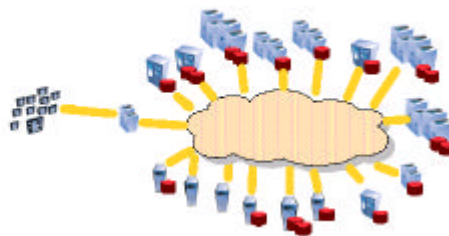
Simple and Easy E-business Service Integration



Current Integration Model



Web services Model



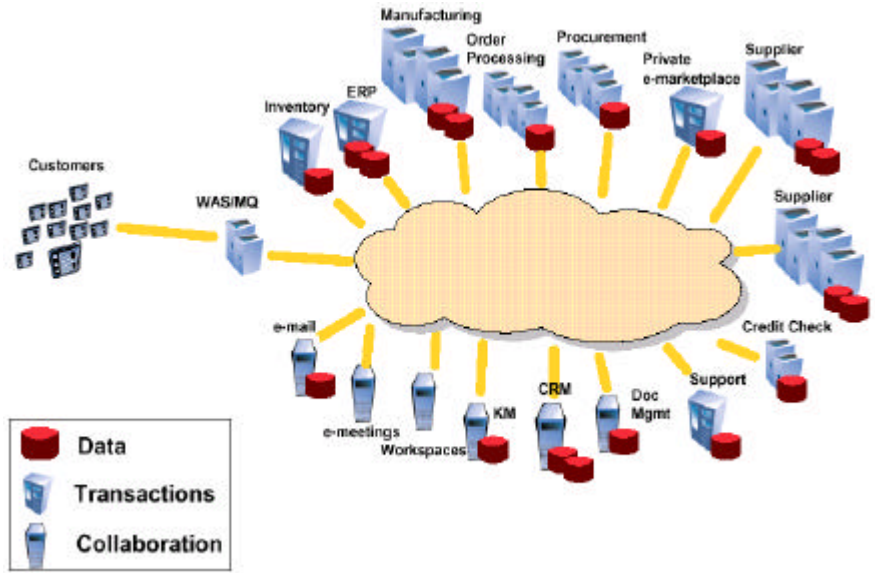
**Web services model reduces the interdependencies,
system-specific integration, and management overhead
of dynamic Web applications.**

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Web Services Model

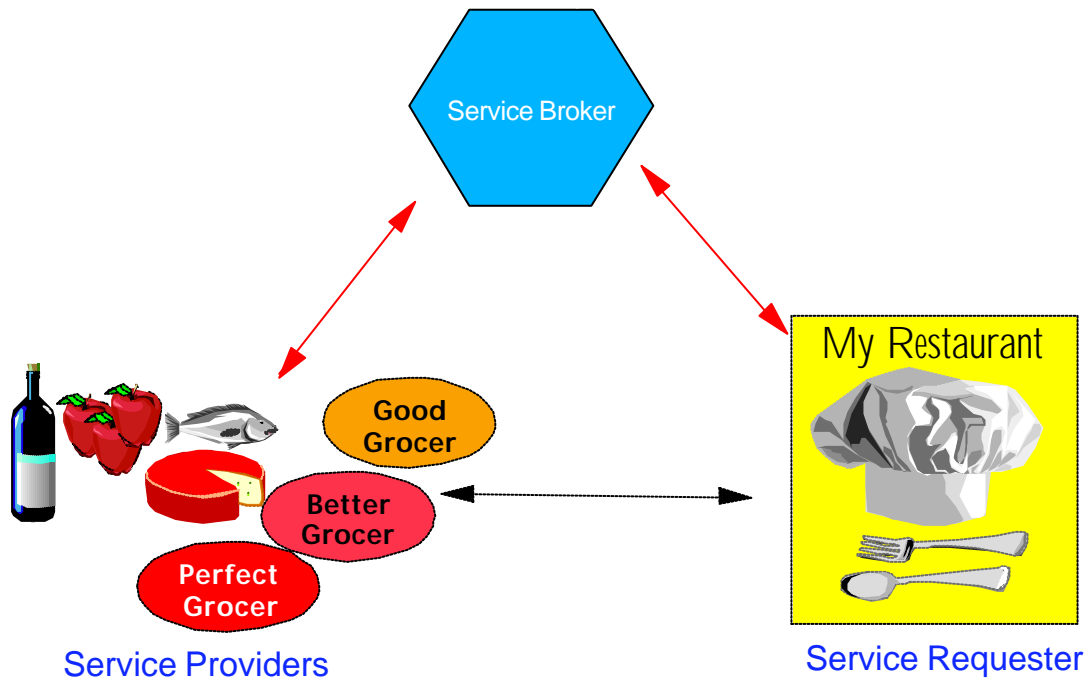


Web services perform all integration in a single common infrastructure



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Why Web Services?



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Web Services: Key Functions



Service Broker

- A searchable repository of service descriptions
- Service Providers publish their services
- Service requesters find services



Service Provider

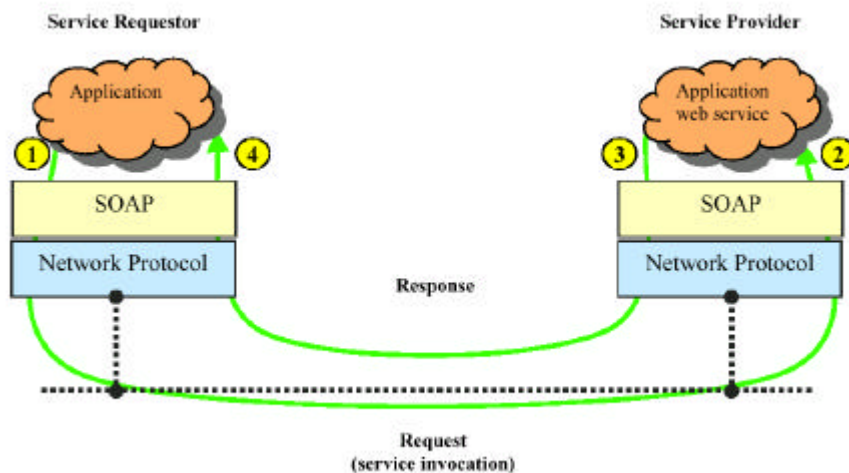
- Provide applications as Web Service
- Publish their services

Service Requester

- A client that needs a service
- Publish their needs

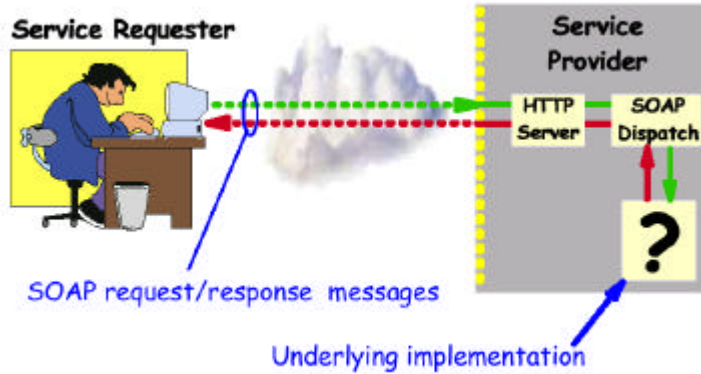
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XML Messaging Using SOAP



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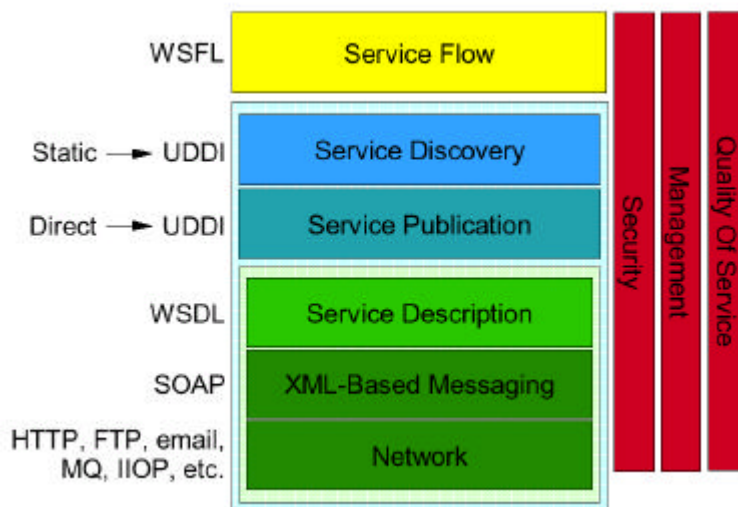
SOAP Web Service Client and Server



SOAP hides the underlying implementation
(Java?, Cobol?, Stored Procedure?)

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The Conceptual Web Service Stack



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IBM and Web Services



IBM Leadership in Web Services

■ SOAP - Simple Object Access Protocol

- ▶ Standard for XML based request and response - light weight RPC
- ▶ Co-author of specification (with Microsoft)
- ▶ First implementation
- ▶ Chair of XML Protocol working group in W3C
- ▶ Contributor of SOAP4J to Apache open source project

■ WSDL - Web Services Description Language

- ▶ Standard for defining Web Services
- ▶ Co-author of specification (with Microsoft)
- ▶ First WSDL toolkit implementation on AlphaWorks

■ UDDI - Universal Description, Discovery and Integration

- ▶ Standard for publishing and finding Web Services
- ▶ Co-designer (with Microsoft and Ariba)
- ▶ Leader in creation of UDDI project
- ▶ UDDI Business Registry beta host

■ XML & Web Services Development Environment

- ▶ Create, Test, Deploy and Publish Web Services
- ▶ Currently in WebSphere 4.0 and AlphaWorks
- ▶ Part of tooling strategy



Web Services in IBM Products



- **WebSphere Application Server**
 - ▶ XML, XSLSOAP and UDDI standard in version 4.0
- **DB2 Universal Database: XML Extender**
 - ▶ Web Services for query retrieval
- **MQ Series**
 - ▶ Web Services can run as MQ messages (garantied delivery)
 - ▶ MQ Workflow (Web Services in multi-step business processes)
- **Lotus Domino**
 - ▶ Services as Web services and SOAP messaging
- **WebSphere Portal Server**
 - ▶ Portlets draw on Web Services and distributed Portlets as W.S.
- **IBM Learning Management System**
 - ▶ SCORM compliant. Web Services interface
- **Web Services Development and Deployment**
 - ▶ Wizards and tools for developing and deploying Web Services

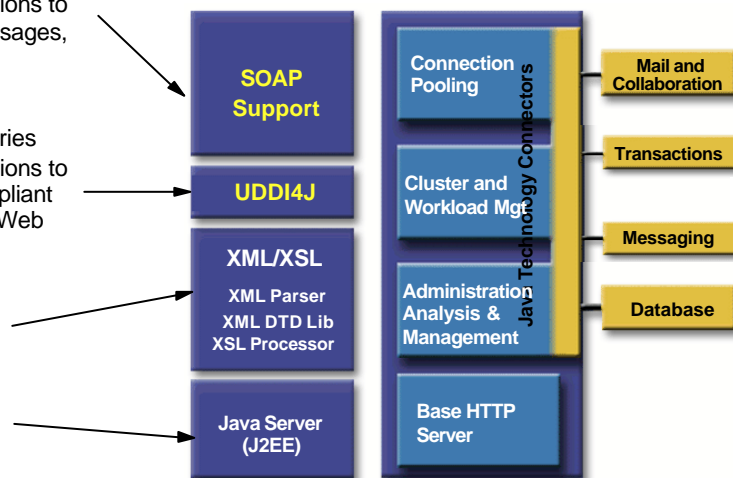
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WebSphere 4.0 Support for Web Services



- **Integration of SOAP Support**
 - ▶ SOAP server and client environments
 - ▶ Enables WebSphere applications to send and receive SOAP messages, and leverage WSDL
- **Integration of UDDI4J**
 - ▶ Java interface to UDDI registries
 - ▶ Enables WebSphere applications to communicate with UDDI-compliant registries to publish and find Web services
- **Basic XML/XSL processing**
 - ▶ XML parser
 - ▶ XSL processor
- **Java Server J2EE**
 - ▶ JSP and Servlets
 - ▶ Java Beans and EJB
 - ▶ JDBC, JMS, JNDI, JTA etc.

WebSphere Application Server 4.0



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Presentation of Web Services as Portlets

Source Portal - Microsoft Internet Explorer

Address: <http://wsp011.boebingcn.de.ibm.com/myportal>

Monday, March 5, 2001 2:02:34 PM

IBM WebSphere Portal Server

Home Page

Login:

Welcome Chris!

Reminders Aidan's birthday, March 17

Part Transactions

Please choose one of the following transactions

- Part Lookup
- BOM Lookup
- Purchase Order History

Inbox

| From | Subject | Received |
|----------------|------------------------------|---------------------|
| Brad | CTO Job Posting for LE | 1/9/2001 8:47 AM |
| EarthLink S... | \$100 Off EarthLink Wireless | 2/27/2001 12:10 PM |
| Fivehigh90 | Hi! Stanley | 3/4/2001 11:07 PM |
| Jo Jones | Hey! | 12/20/2000 11:29 AM |
| Jo Jones | Interesting thoughts | 3/6/2001 9:25 AM |

News

World News:

IBM invests in semiconductor plant: IBM announces plans to build a new semiconductor plant in New York.

Politics:

American Public Cheers Congressional Move: 98% of the respondents to a recent poll conducted by Poll-R-US, support Congress extending its vacation with many indicating "Don't Come Back!".

Search

Search for:

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Learning Management Systems, XML and Web Services

Learning Management
Systems
xml and Web Services

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Why XML in Learning Management Systems?



■ Interoperability

- ▶ Unlock learning resources from vendor specific formats
- ▶ Produce learning resources on different platforms
- ▶ Deliver learning resources on different platforms

■ Re-use of learning resources

- ▶ Shared meta-tagging
- ▶ Shared storage, search and retrieval mechanisms
- ▶ Pick and mix of learning resources
 - ♦ customized training plans and schedules
 - ♦ Distribution on demand
- ▶ Different presentation formats from same learning resource
 - ♦ Supports different media, different languages, different brandings

■ Align with other branches

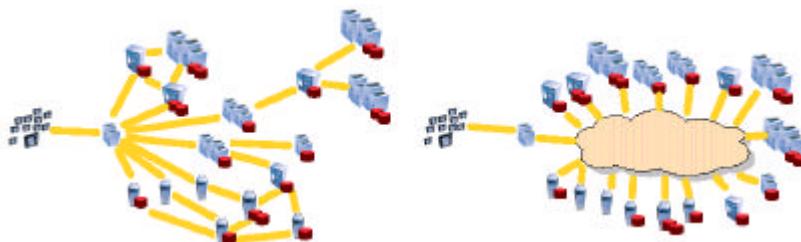
- ▶ eBusiness etc.
- ▶ Share general IT improvements

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Why Web Services



- The intent is to leverage Web services to **embed** e-learning functionality into business applications such as CRM and ERP
- With the foundation of an open architecture in place, the door is opening to Web services -- and the related capability to surface e-learning as **events within** other applications
- As e-learning platforms and content evolve toward open standards, the capability to surface learning **seamlessly within the context** of enterprise applications and business processes is almost within reach



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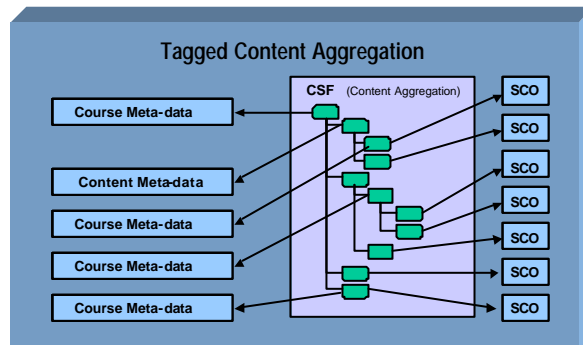
Sharable Content Object Reference Model

- SCORM is a set of specifications for
 - ▶ developing, packaging and delivering high-quality education and training materials
 - ▶ whenever and wherever they are needed
- SCORM is RAID
 - ▶ **Reusable:** modified and used by different development tools
 - ▶ **Accessible:** can be searched and made available as needed by both learners and content developers
 - ▶ **Interoperable:** operates across a wide variety of hardware, operating systems and web browsers
 - ▶ **Durable:** does not require significant modifications with new versions of system software.

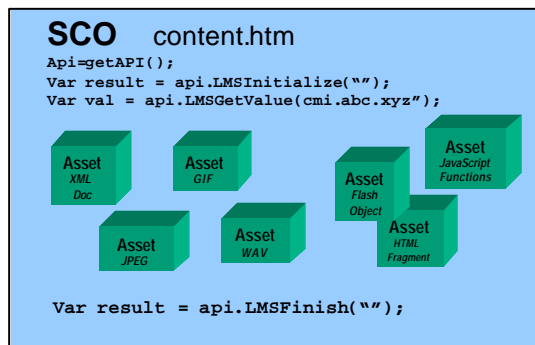
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Course Content Aggregation and Reuse

Course Structure Format



Content Package



Sharable Content Objects
RawMedia Meta Data Added

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IBM Learning Management System

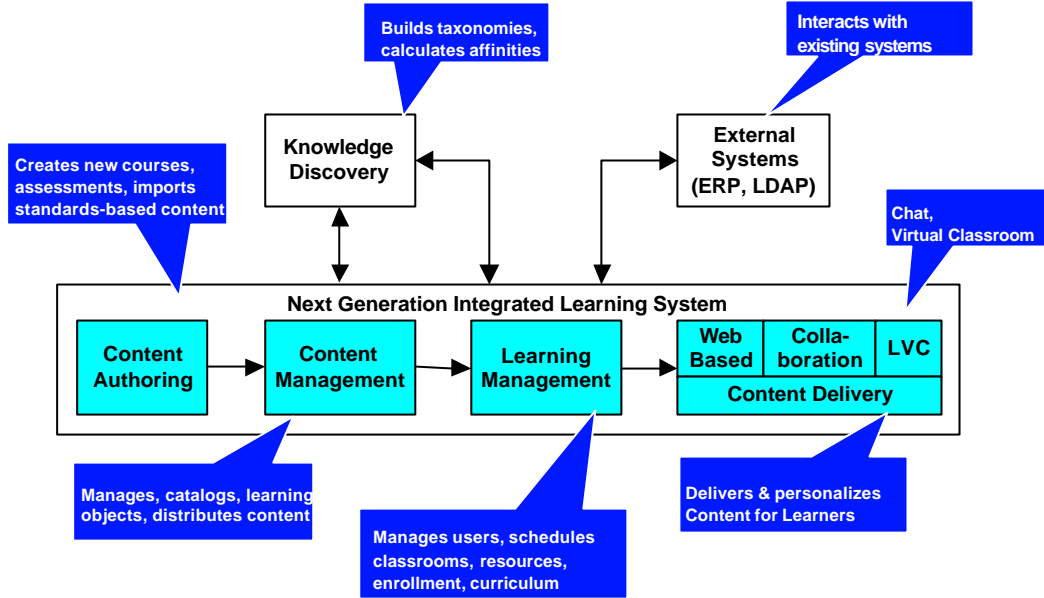


IBM Learning Management System Features

- A scalable, flexible e-learning solution for managing classroom-based and e-learning activities, resources, curriculums, and catalogs across the enterprise.
- Maximizes value for all modes of training delivery (self-paced, virtual learning and collaboration, physical classrooms).
- Supports requirements for compliance, certifications, accounting, ERP integration.
- Manages the overall learning environment, including:
 - ▶ Physical classroom support
 - ▶ Student enrollments
 - ▶ Reporting and tracking of activities
 - ▶ Calendar and scheduling
 - ▶ Notifications, alerts
 - ▶ User profiles



Authoring, Delivering, Tracking Learning Activities



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IBM Learning Management System and SCORM

| Conformance | IMS | AICC | SCORM Conformance |
|---------------------------------|-----------------------|--------------------|-----------------------------|
| Learning Object Metadata | | | |
| Information Model | IMS | NA | SCORM 1.2 (IMS profile) |
| XML Binding | IMS | NA | SCORM 1.2 (IMS profile) |
| Content Aggregation | | | SCORM 1.2 (IMS) |
| Content Packaging | IMS Content Packaging | AICC CMI v2.2 | SCORM 1.2 (IMS) |
| Sequencing | draft 8.0 | NA | NA - future SCORM 1.3 |
| Runtime Communication | | | |
| Data Model | NA | CMI | SCORM 1.2 (AICC data model) |
| Transport | NA | CMI v. 2.2 HACP | SCORM 1.2 (AICC CMI API) |

IMS: Instructional Management System, AICC: Aviation Industry CBT Committee

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LMS System Integration



■ Domino

- ▶ Mail (SMTP) & Calendar (iCal)
- ▶ Discussion threads & awareness

■ Extend the LMS

- ▶ Web Services & Java APIs
- ▶ LDAP for user information

■ Portals

- ▶ Integration with WPS & Dynamic workplace
- ▶ Three portlets available out-of-the-box
 - ♦ My Courses, My Activities, Catalog Search
- ▶ Create your own portlets from our web services
 - ♦ “LMS building blocks”

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