

Enterprise Application Integration (EAI) Technologies for Data Administrators

Section 1

XML/XSLT Concepts for Data Administrators

Clive Finkelstein



- Acknowledged as "Father" of Information Engineering (IE)
- Managing Director, Information Engineering Services Pty Ltd
- Internationally renowned consultant and instructor with completed projects for Defense, Government, Commercial organizations throughout world and in most industries.
- His focus addresses Enterprise Application Integration (EAI) using Data Warehouses, XML , Web Services, BizTalk, ebXML and Corporate Portals.
- Also provides training and consulting in implementation of Zachman Framework for Enterprise Architecture.
- In-house skills-transfer courses and webcast seminars presented by Clive Finkelstein are at web site below.

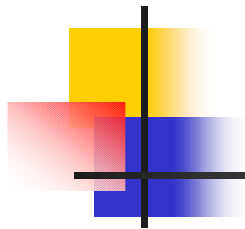
Partial List of Books:

- "Information Engineering", James Martin and Clive Finkelstein, Savant Institute, Carnforth: UK (1981)
- "An Introduction to Information Engineering", Clive Finkelstein, Addison-Wesley, Sydney: Australia (1989)
- "Information Engineering: Strategic Systems Development", Clive Finkelstein, Addison-Wesley, Sydney (1992)
- "Building Corporate Portals with XML", Clive Finkelstein and Peter Aiken, McGraw-Hill New York: NY (2000).

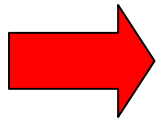
Visit <http://bne002i.webcentral.com.au/catalogue/visible/default.shtml> for book extracts and course details.

Email: cfink@ies.aust.com

www.ies.aust.com/~ieinfo

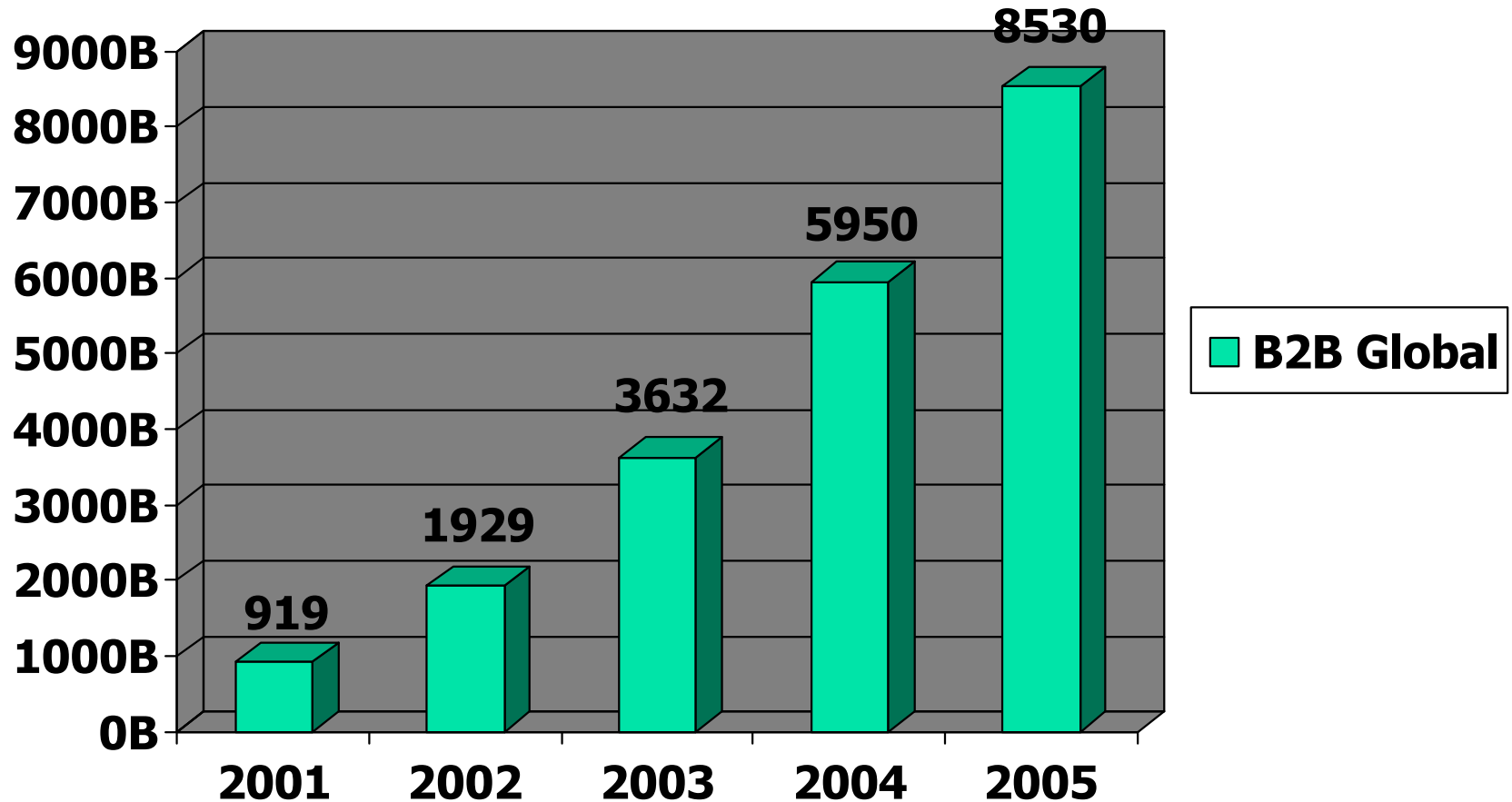


Session Topics



- **B2B e-Business Integration Issues**
 - B2B Cost Effectiveness Business Drivers
- **From Data Warehouse to Enterprise Portal**
 - Collaborative, BI and Integration Portals
- **Introduction to XML and XSL**
 - Demonstration using Internet Explorer 5.0 (or higher)

B2B Market Potential (in \$US Billions)



Source: Gartner Group (Feb 2001)



B2B Business Drivers

- Purchasing and Invoicing Costs
 - Organizations process millions of invoices each year
 - 75 % typically items costing < \$1,000 (Gartner Group)
- Cost of typical Purchase Order, with approvals
 - Often Costs between \$100 - \$150
 - This transaction processing cost is static. No difference whether item dealt with is \$5 box of pens or \$5,000 computer ... \$100-\$150 processing cost remains the same
 - Drops in cost down to between \$8 - \$10
 - Complete manual purchase requisition cycle lasts on average 7.3 days ... compared to 2 days with automated buy-side e-commerce system (Aberdeen Group)



Enterprise Terminology

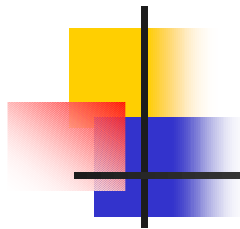
Consider XYZ Corporation

- Order Entry System in Order Entry Department
 - Accepts Orders from “Customers” – in CUSTOMER Table
- Credit Control System in Credit Control Dept
 - Credit-worthiness of “Clients” – in CLIENT Table
- Finance Department Accounts Receivable
 - Accounts Receivable uses “Debtors” – in DEBTOR Table
- Purchasing Department
 - Deals with “Suppliers” – in SUPPLIER Table
 - If Customer also a Supplier, address details are redundant
- Finance Department Accounts Payable
 - Accounts Payable uses “Creditors” – in CREDITOR Table



Enterprise Application Integration

- Consider now – ABC, Inc and DEF Enterprises
 - Both buy products from XYZ
- Using XML, ABC sales orders appear as:
 - `<Customer>ABC, Inc</Customer>`
 - `<Customer>` is start tag and `</Customer>` is end tag
 - XML tags surround and identify relevant data
 - Clearly ABC, Inc is a customer
- Credit Control and Finance Depts see ABC as:
 - `<Client>ABC, Inc</Client>`
 - `<Debtor>ABC, Inc</Debtor>`



Consider XYZ Customers

- ABC and DEF are Customers of XYZ
 - So XYZ is supplier to ABC and DEF
 - ABC Procurement System issues Purchase Order, which is then printed and mailed or faxed to XYZ
 - On receipt, XYZ enters PO into Order Entry System
 - XYZ sends Order Acknowledgement document to ABC, then Delivery Advice and Supplier Invoice
- XML allows reentry step to be bypassed
- XML adds transformation front-end
 - Enterprise Application Integration (EAI)
 - Many software tools and products for EAI



ABC Purchase Order (in XML)

- XML is readable by man and machine
- Start tag (EG. <Name>)
 - Must be followed by end tag (</Name>)
- Tag is single word
 - No spaces, first char letter
- Uses Elements
 - EG. <Party>
- Attributes in Elements
 - EG. Type="Buyer"

ABC PO Format - Smith and Co

```
<PurchaseOrder>
  <Party Type="Buyer">
    <Reference>AB24567</Reference>
    <Name>Smith and Co</Name>
    <Street>123 High St</Street>
    <Town>Epping Forest</Town>
    <PostCode>E15 2HQ</PostCode>
  </Party>
  <Party Type="Supplier">
    ...
  </Party>
  <OrdNo>1234<OrdNo>
  <OrderItem>
    ...
  </OrderItem>
  <Tax Type="VAT" Percent="17.5">
    ...
  </Tax>
  ...
</PurchaseOrder>
```



ABC and DEF Purchase Orders

DEF PO Format – Smith and Co

```
<PurchaseOrder OrderNo="1234">
  <Buyer BuyerNo="AB24567"
    Name="Smith and Co">
    <Address1>123 High St</Address1>
    <Address2>Epping Forest</Address2>
    <Zip>E15 2HQ</Zip>
  </Buyer>
  <Supplier>
    ...
  </Supplier>
  <OrderItem>
    ...
  </OrderItem>
  <Tax>
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  </Tax>
  ...
</PurchaseOrder>
```

- *Different organizations can define same data in different ways*
- *Enterprise Application Integration uses XML to resolve differences*



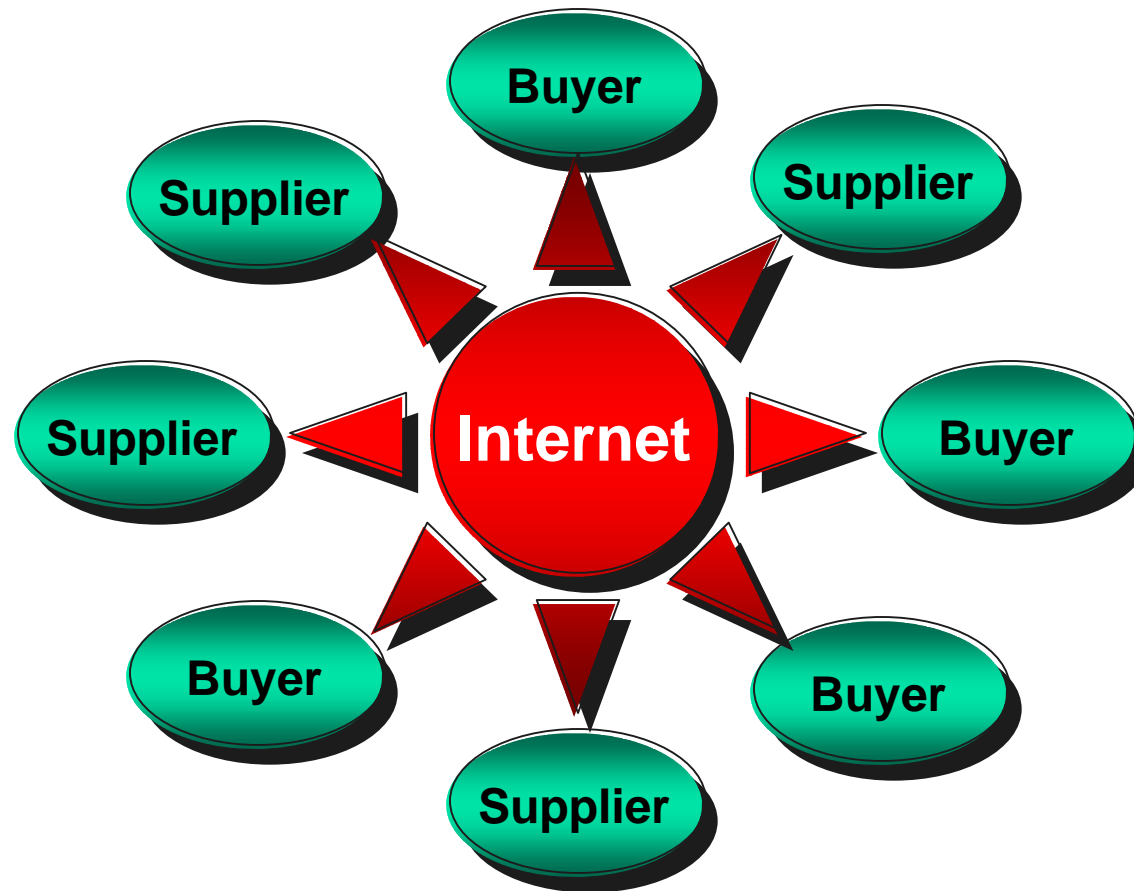
Enterprise Application Integration

- Different Formats and Terminology
 - XML offers great benefit for EAI

e-Commerce and e-Business

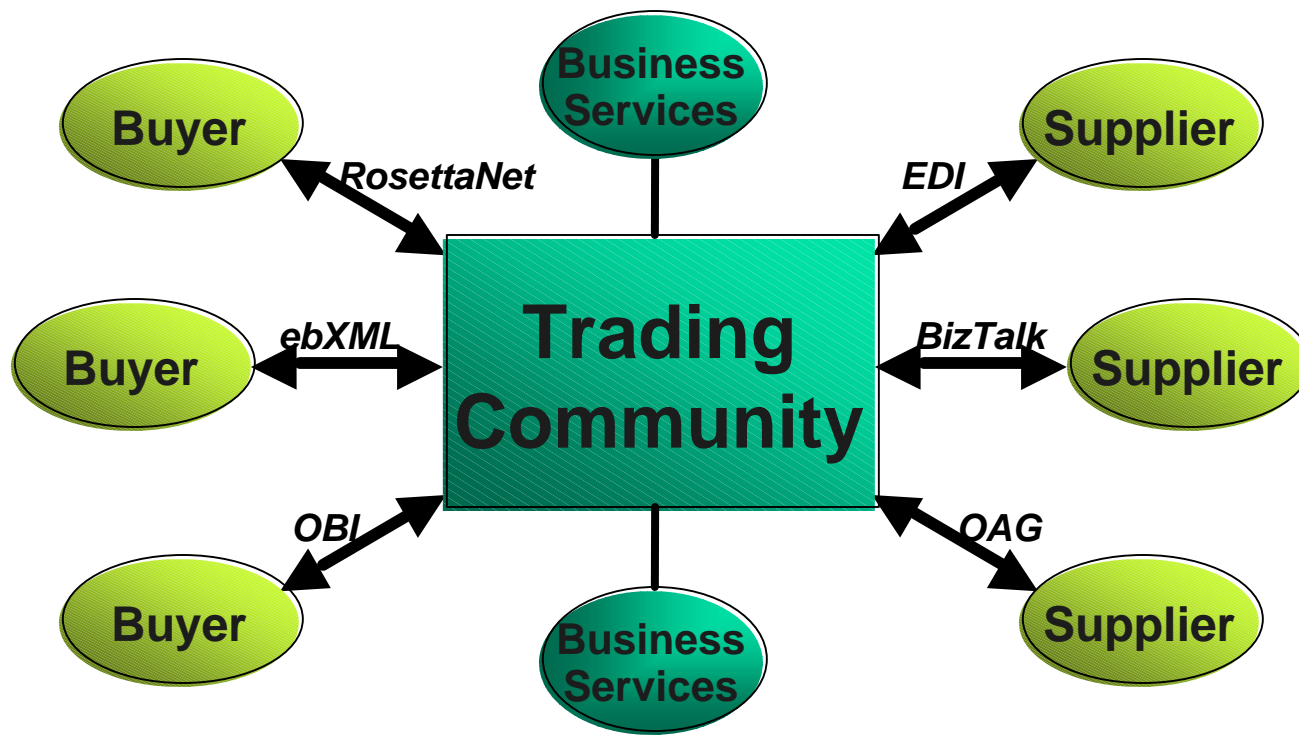
- e-Commerce
 - Sale of products and services over the Internet
- e-Commerce is NOT e-Business
 - e-Business sells products online (ie. e-Commerce)
 - e-Business also links sales tightly to back-end systems for order processing and delivery fulfillment

B2B Environment



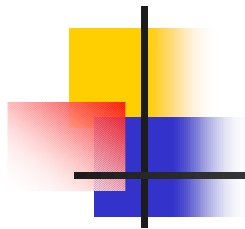
- Internet can connect buyers and suppliers, globally

Trading Communities



Trading Communities Need EAI and XML

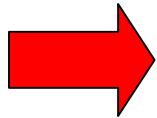
- Example: GM, Ford and Daimler/Chrysler in USA
 - Covisint Trading Community
 - Similar activity in most other industries



Session Topics

- **B2B e-Business Integration Issues**

- B2B Cost Effectiveness Business Drivers



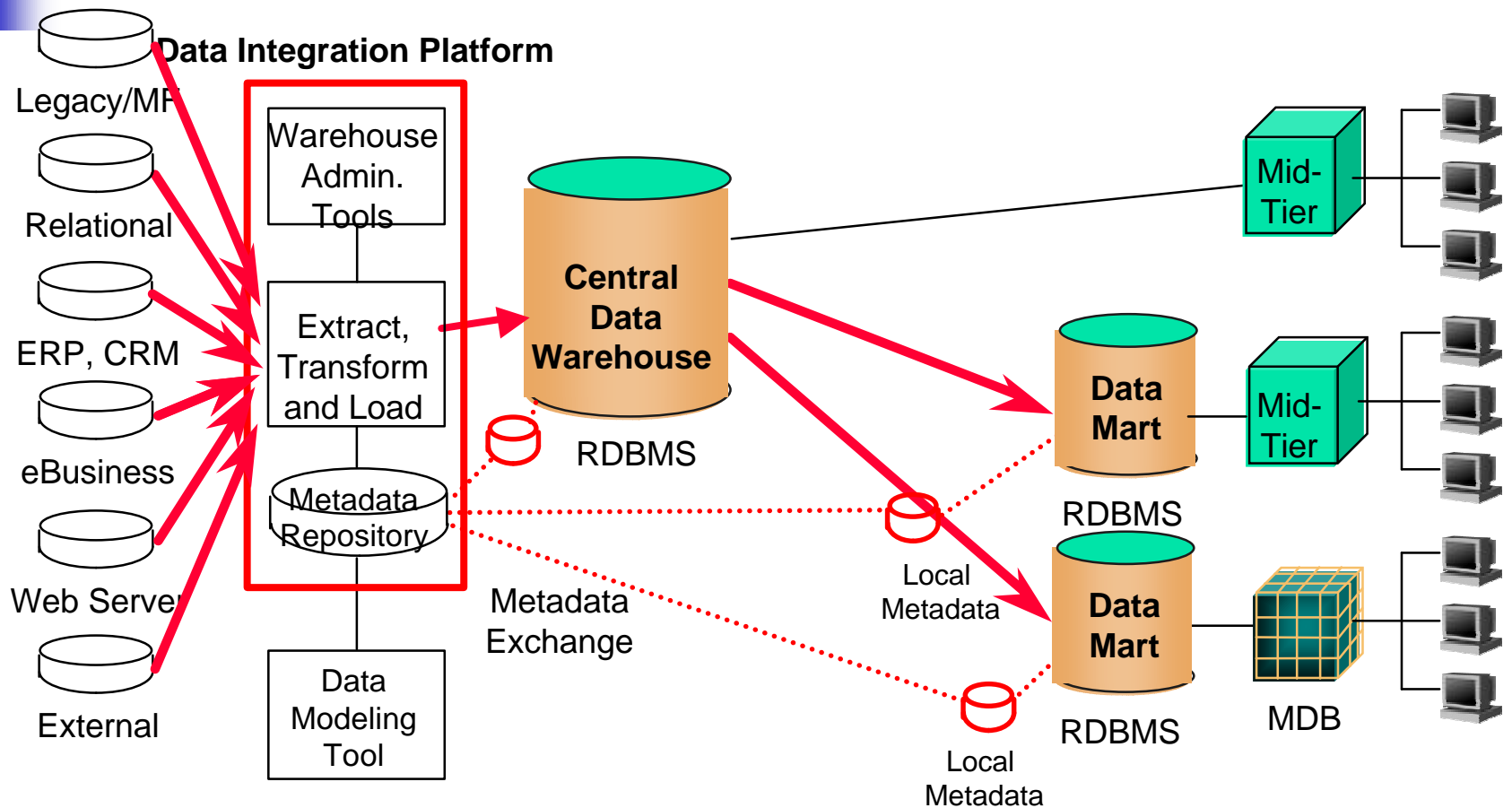
- **From Data Warehouse to Enterprise Portal**

- Collaborative, BI and Integration Portals

- **Introduction to XML and XSL**

- Demonstration using Internet Explorer 5.0 (or higher)

Access via Data Warehouse ...



**Source
Databases**

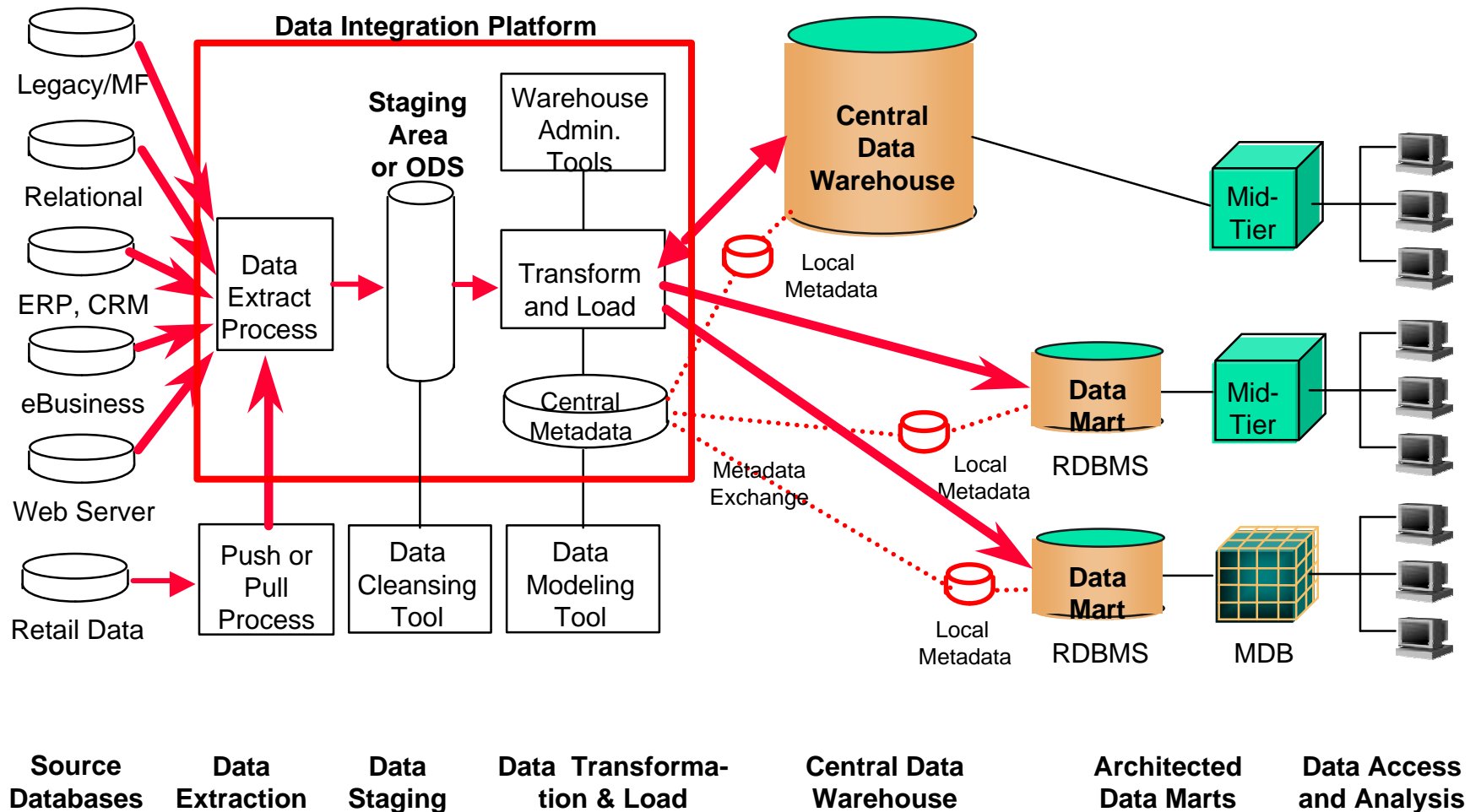
**Extract, Transform,
Load Central DW**

**Central Data
Warehouse**

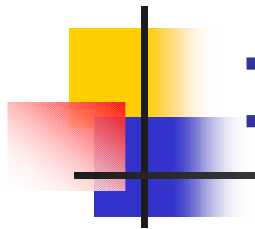
**Architected
Data Marts**

**Data Access
and Analysis**

Integration via Data Warehouse



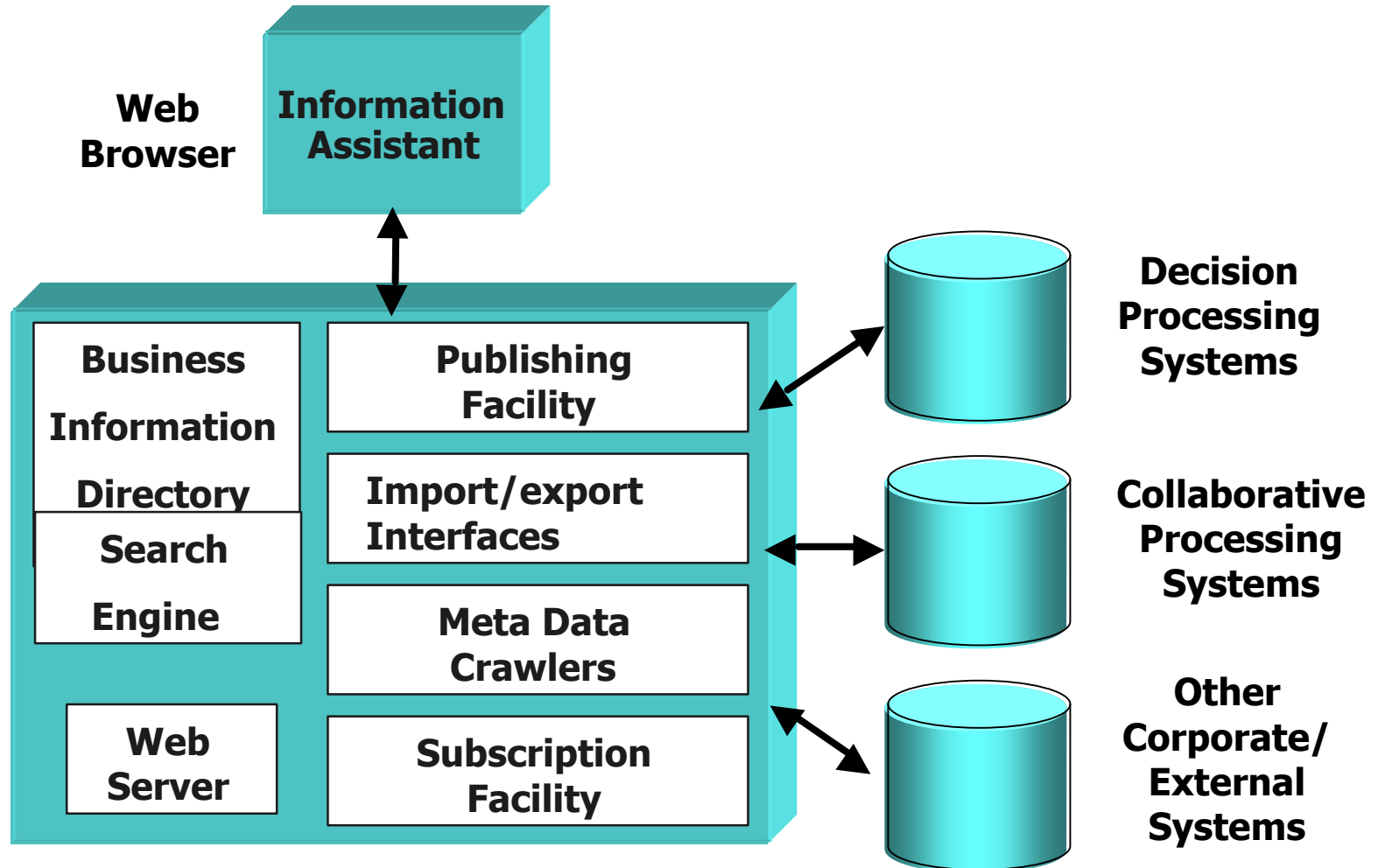
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Integration via Corporate Portal

- Corporate Portals provide access to BI data in DWs, with dynamic access to related data in structured data bases
 - Dynamic access, not static access via ETL tools
- Access also to related unstructured data in documents, reports, email, images, graphics, maps, audio, video etc
 - Based on XML, with data transformation via XSLT
- Integrated through separate windows in Browser, via Intranet, Extranet, Internet
- **“Virtual Integration” at Portal desktop**

Enterprise Portal Architecture



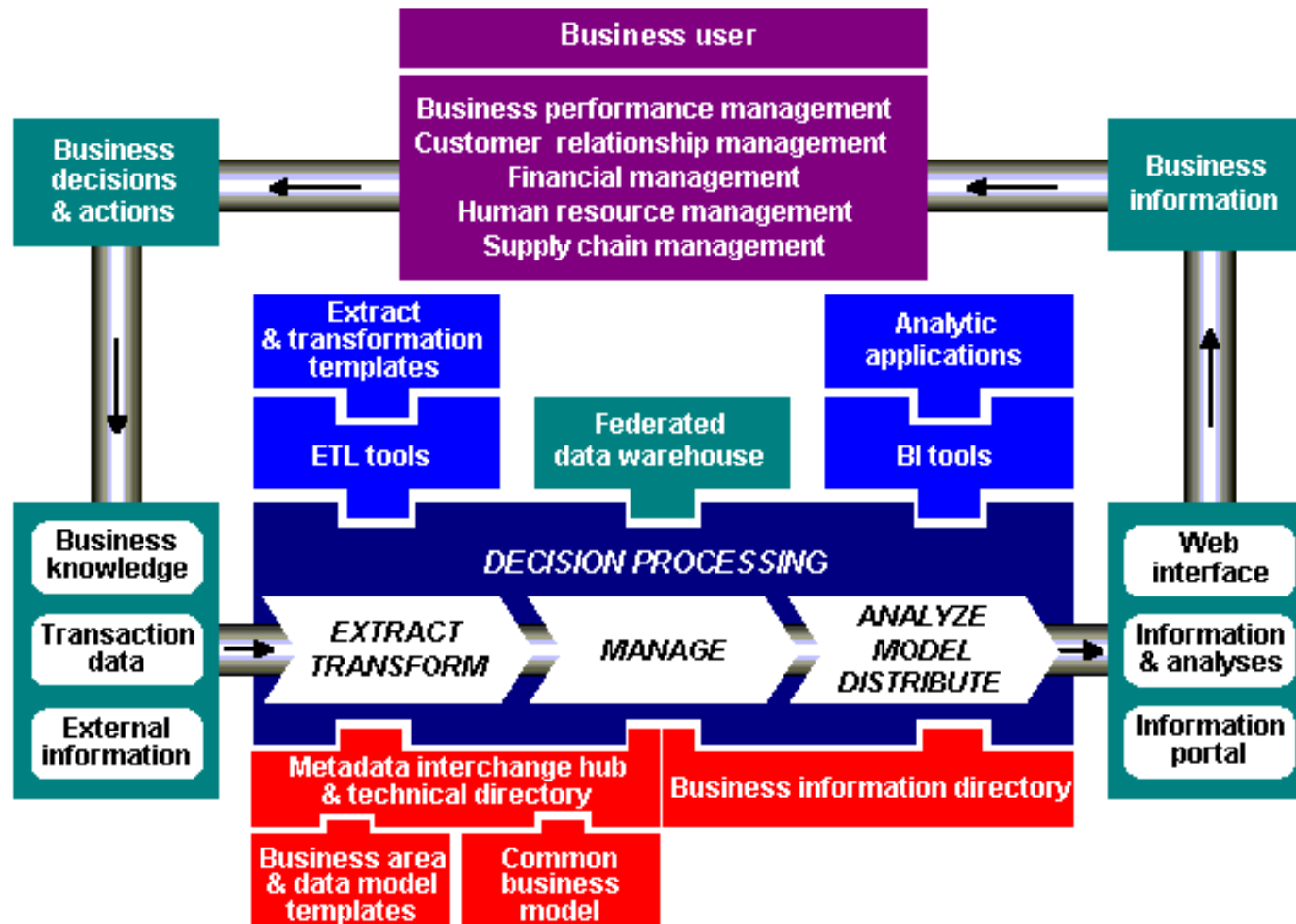
Source: www.databaseassociates.com



Examples of Enterprise Portals

- **Corporate Portal or Enterprise Portal**
 - "A single gateway via corporate Intranet or Internet to relevant workflows, application systems and databases – integrated using XML and tailored to the specific job responsibilities of each individual."
- **Corporate Portal as "Employee Portal"**
 - "A single gateway to the enterprise so employees can access processes, systems and databases via Intranet or Internet to carry out their relevant job responsibilities, with full security"
- **Corporate Portal as "Customer Portal"**
 - "A single gateway across Internet, or via secure Extranet, to details about products and services, catalogues, and order and invoice status for customers – integrated using XML and tailored to the unique requirements of each customer."
- **Corporate Portal as "Supplier Portal"**
 - "A single gateway to purchase orders and related status information for the suppliers of an enterprise."

Data Warehouse and Knowledge Management Evolution to Portals



Source: www.databaseassociates.com



What is a Corporate Portal?

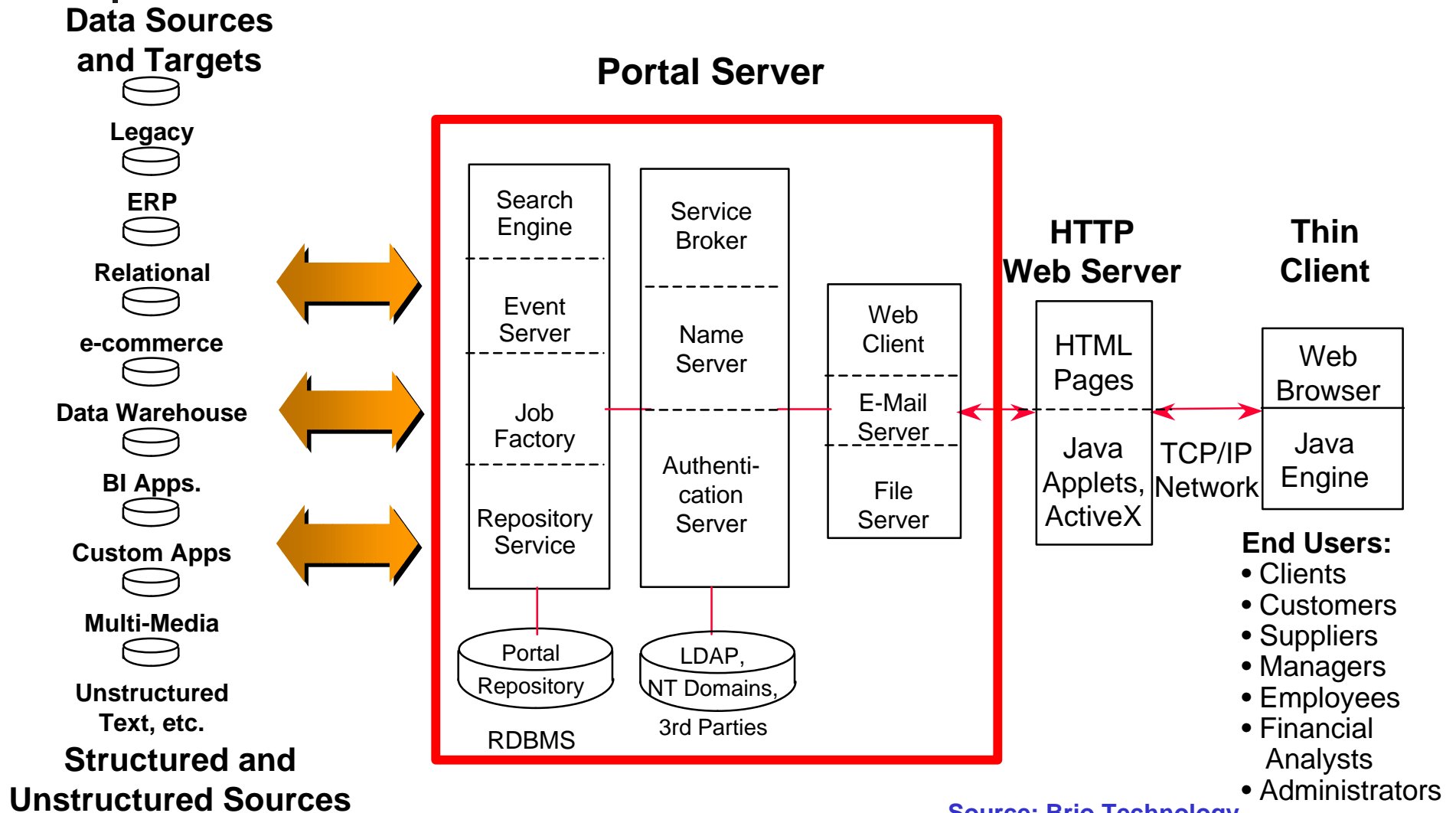
- Single point of access for all corporate data.
 - Gateway to any type of information, both inside and outside the organization
 - Designed to meet the information needs of many different types of information consumers
 - Provides end-user personalization and central point of access to a wide variety of data sources
- Corporate portal delivers targeted information
 - Not general-purpose portal like MyYahoo or MyExcite



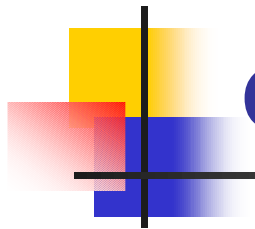
What is a Corporate Portal?

- Enables users to gather information, present it in one place, and organize it according to their job function
 - Administrative assignment of roles and privileges; authorization by permissions and groups
 - End users further customize views to manage desktop
 - Management of user environment, visual presentation, access rights, personalization, search, security, usage
- Seamless interface to underlying applications
 - Personalized responses; streamlining supply chain

Representative Corporate Portal

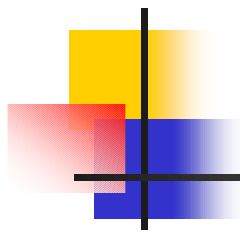


Source: Brio Technology



Generations of Portals

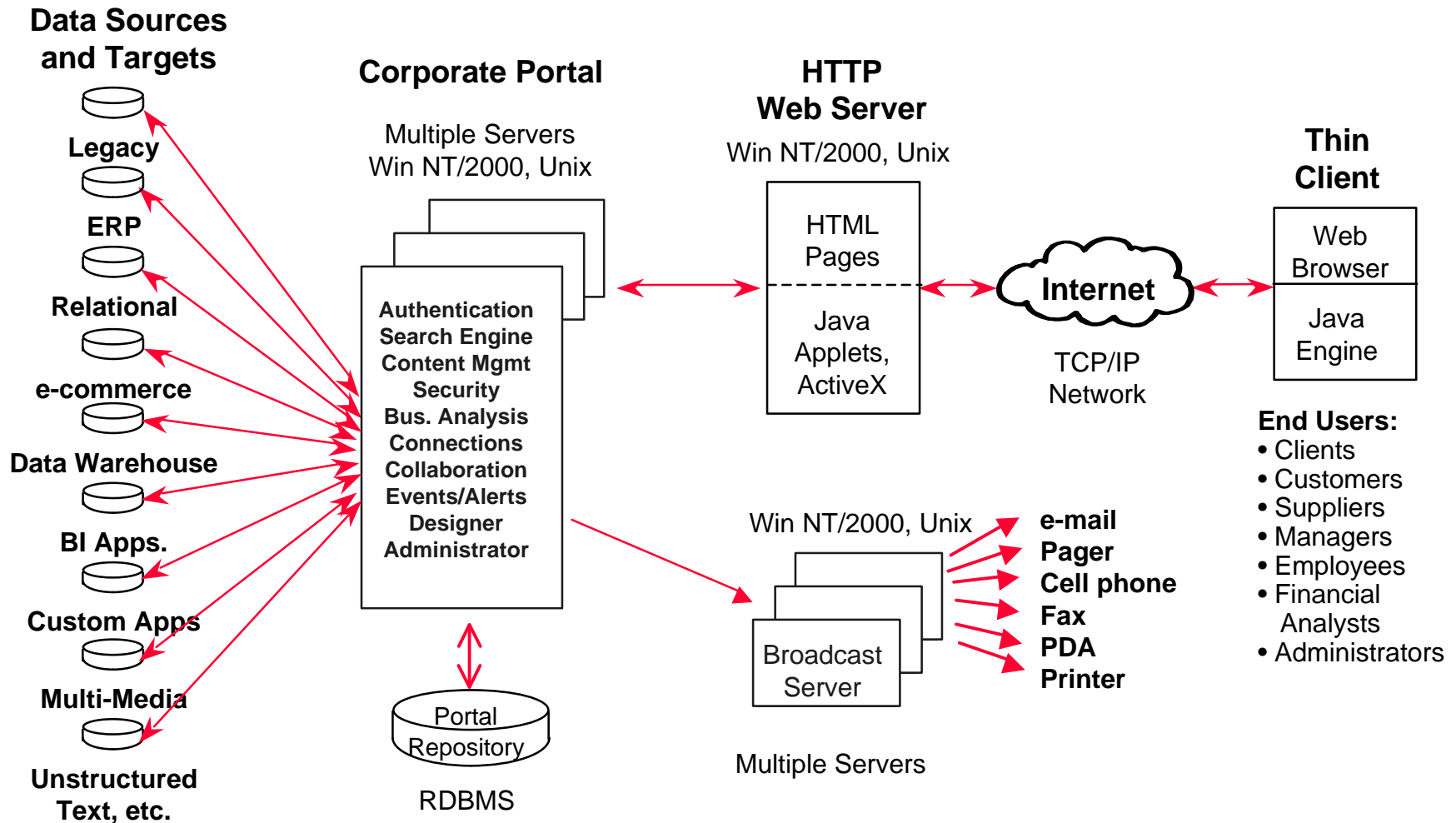
- **Search engine** - ability to search for Web content, access content objects, and link to other objects
- **Personalized view** - ability to create personalized view of portal contents; publish-and-subscribe interaction
- **Personalized interaction** - ability to personalize behavior of portal based on analysis of user response and interaction with underlying applications
- **Component of Enterprise Business Intelligence**
 - portal used to manage e-Business relationships and share information in the e-Business value chain



Convergence of Multiple Technologies

- Search engines and text-retrieval systems
- Knowledge management and document management
- Business Intelligence tools
- Data warehousing infrastructure
- Analytical applications
- e-Commerce and Business-to-Business applications
- Publish-and-subscribe middleware
- Web-authoring and Web-site development tools

Functions Supported by Corporate Portals



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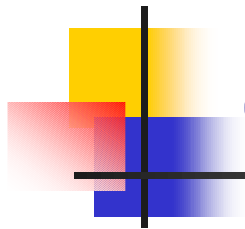
Functions Supported by Corporate Portals

- Single point of content delivery and management
- Access to databases, spreadsheets, text documents, e-mail messages, news feeds, Web pages, audio files, video streams, business applications, etc.
- Support of structured and unstructured information
- Personalized interfaces, including shared services for queries, reports, scheduling, alerts, notification of events, and integration with BI tools
- Management of user environment, including assignment of roles, privileges, permissions, and security



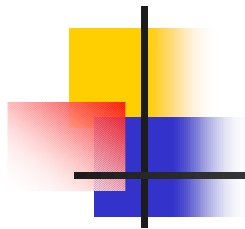
Functions Supported by Corporate Portals (Cont'd)

- Content management, including automatic recognition of multiple data types within a single data source
- Distributed management of repository catalog, including ability to review, approve, or delete content
- Management of user security and authorization from a single point of control
- Restriction of access to objects in the repository by object, individual, and folder
- Scalability to support 100K users, including provision for multiple Web servers and application servers



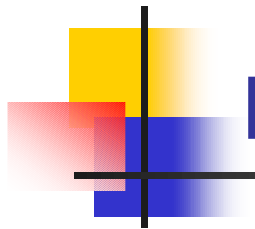
Configuration Options

- Access privileges
- Connect to all available applications
- Assign roles and privileges
- Reconfigure access based on roles and privileges
- Switch roles
- Add or delete resources to a role
- Manage desktop
- Manage areas on the screen
- Rule database behind product



Key Benefits of Corporate Portals

- Provides a single, common, managed user interface to information that supports all categories of end users
- Facilitates e-commerce, Customer Relationship Management, and Business-to-Business applications
- Provides browser-enabled, single access for customers
- Supports new operations, including virtual integration, knowledge-enabled processes, cross-function delivery
- Potentially supports single sign-on, enabling qualified users to sign-on to every site in the network

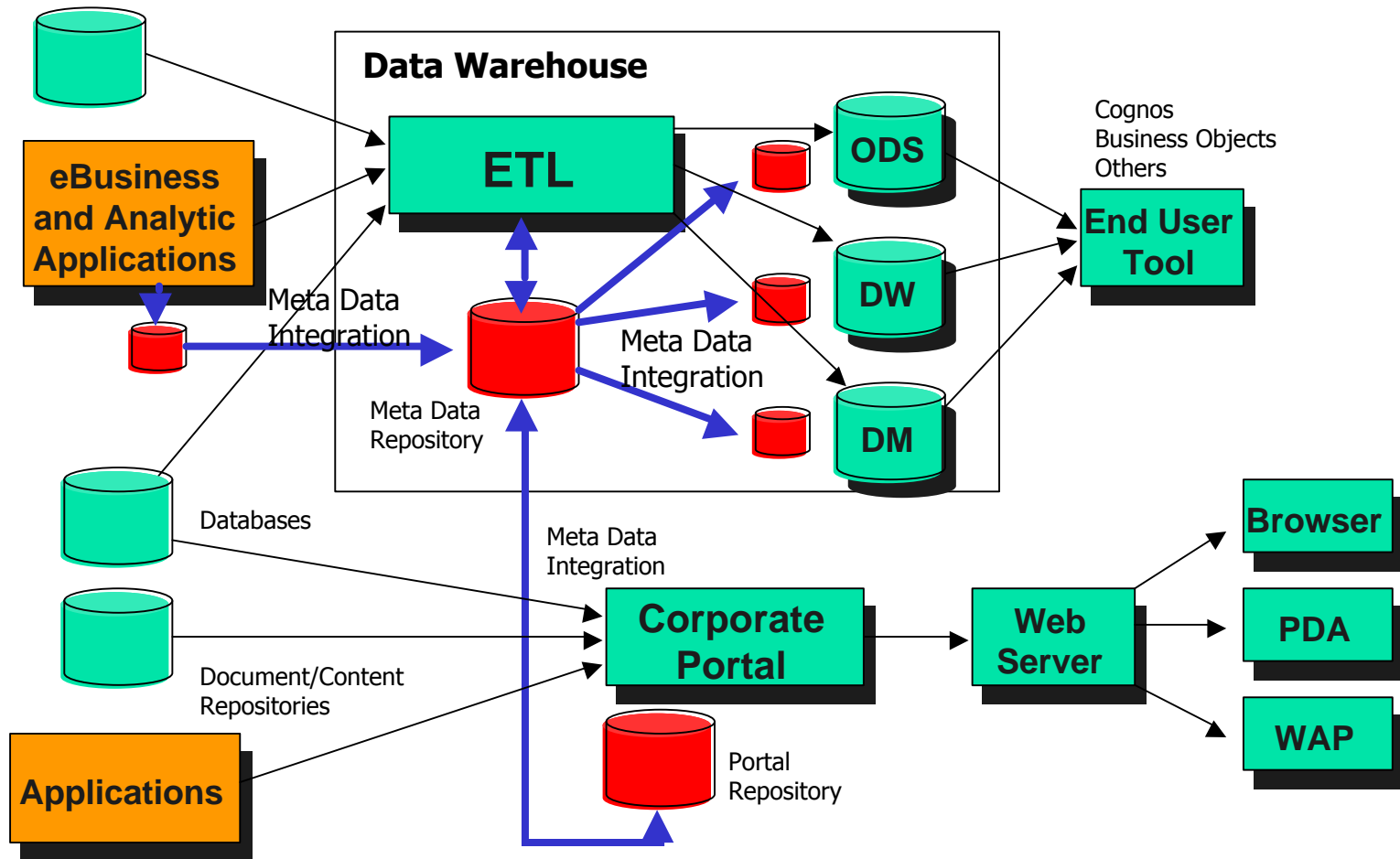


Key Benefits (Cont'd)

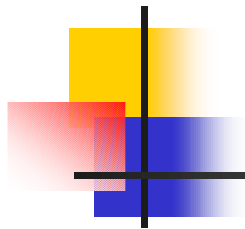
- Supports Web-enabled, distributed environment
- Replaces hardcopy with electronic documentation
- Facilitates sharing and distribution of information
- Permits virtual teams to operate in a distributed environment
- Reduces administrative and operational costs
- Supports rapid response to business challenges
- Ensures security of sensitive corporate information

Business Intelligence Portal Architecture

Data Sources

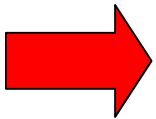


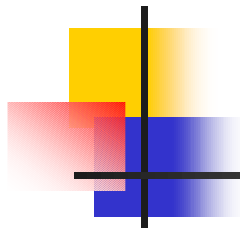
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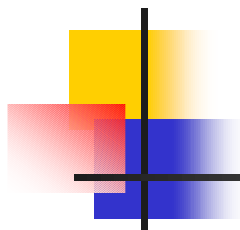


Internet Explorer Examples

XML Data File Example

```
<?xml version = "1.0" ?>
<?xml-stylesheet type="text/xsl" href="title.xsl"?>
<!-- Define XSL Stylesheet to be used with current XML Document -->
<TITLES>
  <TITLE CD="Y">
    <NAME>Data Warehouse Design Solutions</NAME>
    <ISBN>0-471-25195-X</ISBN>
    <AUTHOR>Adamson, Venerable</AUTHOR>
    <PUBLISHER>Wiley</PUBLISHER>
    <REVIEW>Data mart designs and case studies for a
      broad cross-section of industries.</REVIEW>
  </TITLE>
  <TITLE CD="N">
    <NAME>Managing Projects with Microsoft Project 98
      For Windows</NAME>
    <ISBN>0-442-02552-1</ISBN>
    <AUTHOR>Lowery, Ferrara</AUTHOR>
    <PUBLISHER>Van Nostrand Reinhold</PUBLISHER>
    <REVIEW>Practical advice and direction for using
      Microsoft Project 98 to manage projects.</REVIEW>
  </TITLE>
```

....



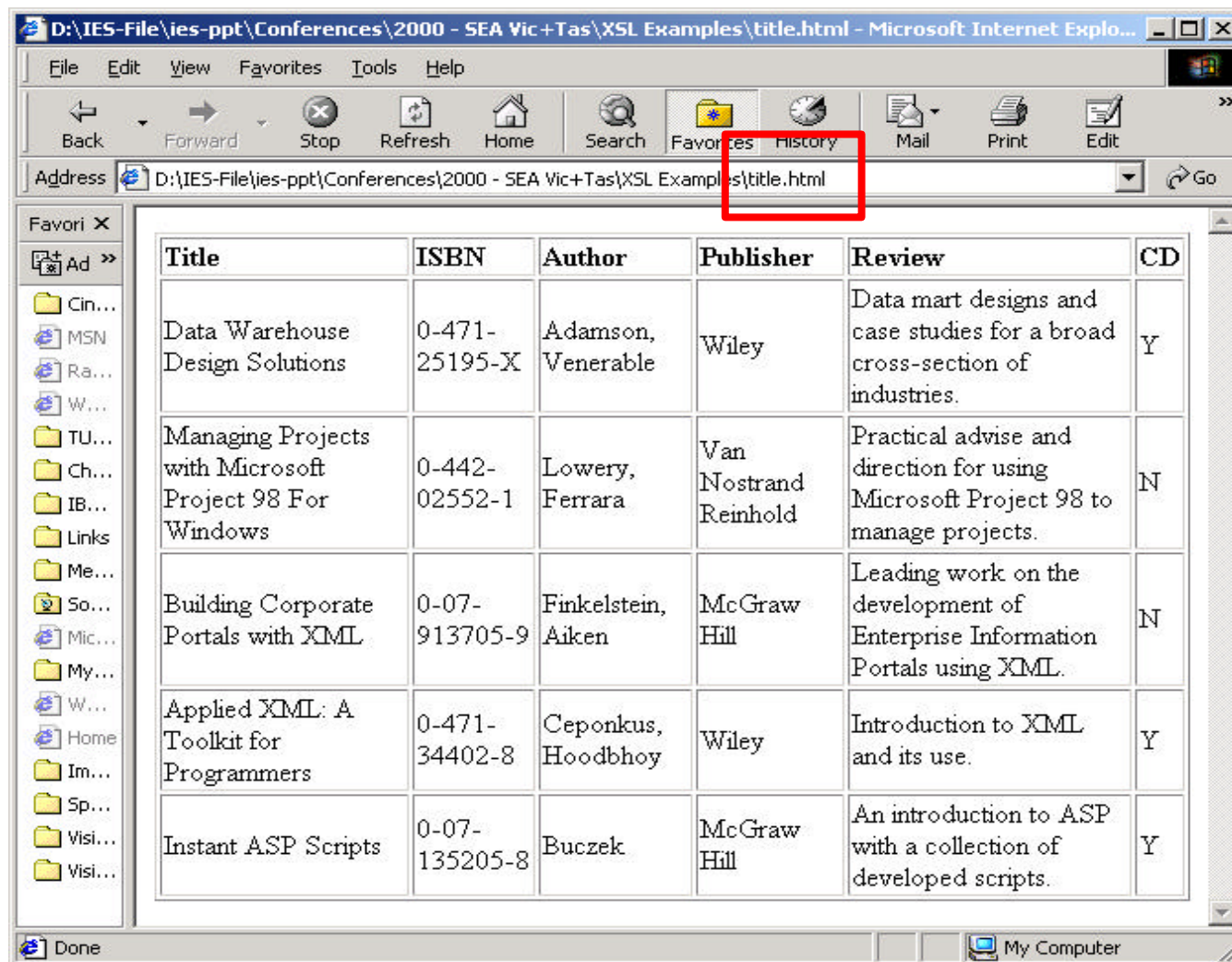
Internet Explorer Examples

XML Data File Example

```
... ..  
<TITLE CD="N">  
  <NAME>Building Corporate Portals with XML</NAME>  
  <ISBN>0-07-913705-9</ISBN>  
  <AUTHOR>Finkelstein, Aiken</AUTHOR>  
  <PUBLISHER>McGraw Hill</PUBLISHER>  
  <REVIEW>Leading work on the development of Enterprise  
    Information Portals using XML.</REVIEW>  
</TITLE>  
<TITLE CD="Y">  
  <NAME>Applied XML: A Toolkit for Programmers</NAME>  
  <ISBN>0-471-34402-8</ISBN>  
  <AUTHOR>Ceponkus, Hoodbhoy</AUTHOR>  
  <PUBLISHER>Wiley</PUBLISHER>  
  <REVIEW>Introduction to XML and its use.</REVIEW>  
</TITLE>  
<TITLE CD="Y">  
  <NAME>Instant ASP Scripts</NAME>  
  <ISBN>0-07-135205-8</ISBN>  
  <AUTHOR>Buczek</AUTHOR>  
  <PUBLISHER>McGraw Hill</PUBLISHER>  
  <REVIEW>An introduction to ASP with a collection of  
    developed scripts.</REVIEW>  
</TITLE>  
</TITLES>
```

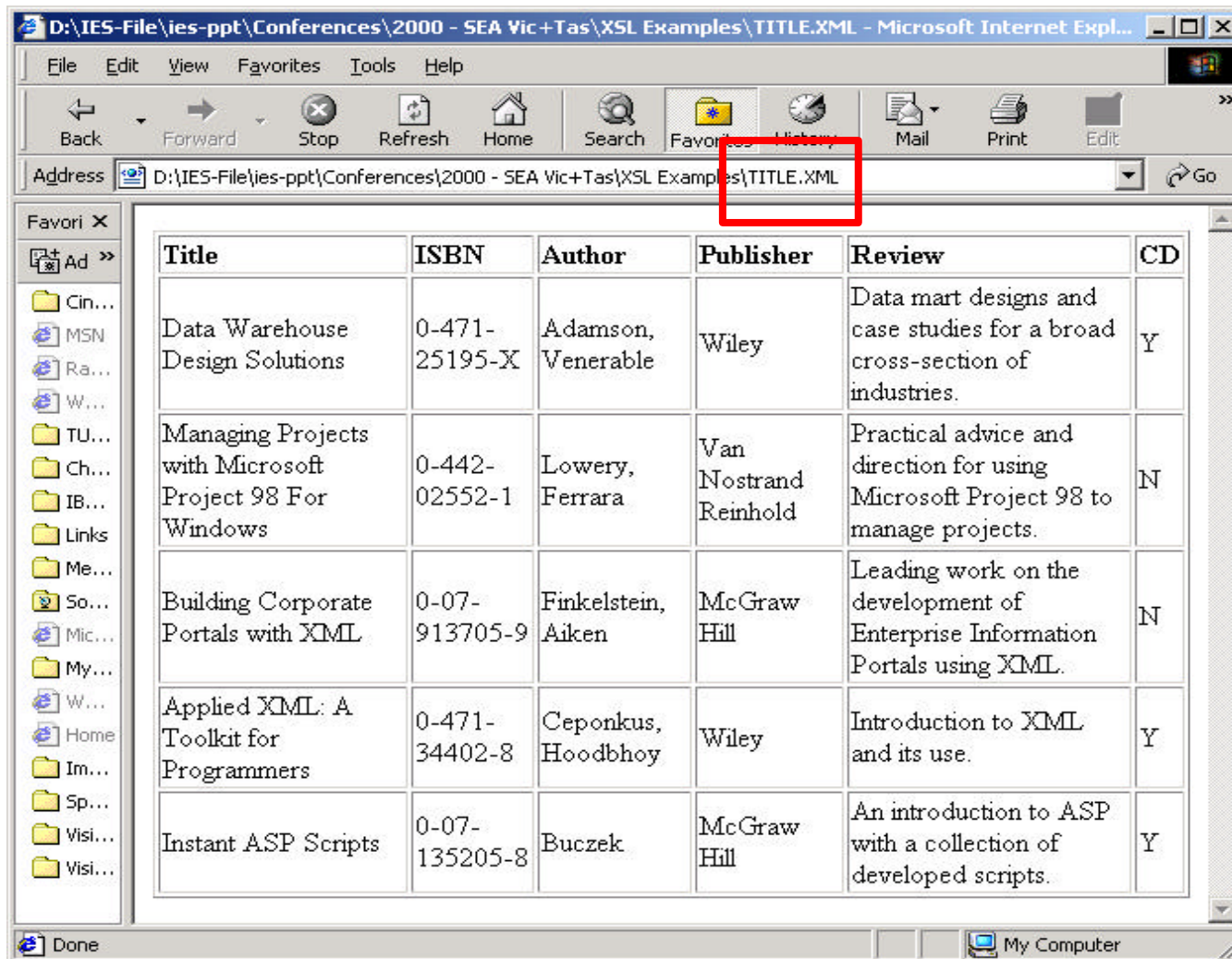
Internet Explorer Examples

HTML Representation



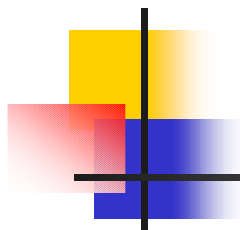
Internet Explorer Examples

XML + XSL Representation



The screenshot shows the Microsoft Internet Explorer browser window. The title bar reads "D:\IES-File\ies-ppt\Conferences\2000 - SEA Vic+Tas\XSL Examples\TITLE.XML - Microsoft Internet Expl...". The address bar shows the file path "D:\IES-File\ies-ppt\Conferences\2000 - SEA Vic+Tas\XSL Examples\TITLE.XML", which is highlighted with a red rectangle. The main content area displays a table with 6 columns: Title, ISBN, Author, Publisher, Review, and CD. The table contains 5 rows of data. The status bar at the bottom shows "Done" and "My Computer".

Title	ISBN	Author	Publisher	Review	CD
Data Warehouse Design Solutions	0-471-25195-X	Adamson, Venerable	Wiley	Data mart designs and case studies for a broad cross-section of industries.	Y
Managing Projects with Microsoft Project 98 For Windows	0-442-02552-1	Lowery, Ferrara	Van Nostrand Reinhold	Practical advice and direction for using Microsoft Project 98 to manage projects.	N
Building Corporate Portals with XML	0-07-913705-9	Finkelstein, Aiken	McGraw Hill	Leading work on the development of Enterprise Information Portals using XML.	N
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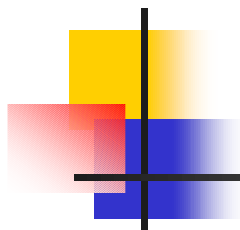


Internet Explorer Examples

XSL Stylesheet

```
<?xml version="1.0" ?>
<!-- XML Declaration -->
<?xsl:stylesheet xmlns:xsl="http://www.w3.org/TR/WD-xsl">
  <!-- declaration that the document is a stylesheet and that it
        is associated with the xsl: namespace -->
  <xsl:template match="/">
    <!-- Apply template to everything starting from the
        root node -->
    <HTML>
      <BODY>
        <TABLE BORDER="1">
          <!-- Set up header row -->
          <TR>
            <TD> <b>Title</b> </TD>
            <TD> <b>ISBN</b> </TD>
            <TD> <b>Author</b> </TD>
            <TD> <b>Publisher</b> </TD>
            <TD> <b>Review</b> </TD>
            <TD> <b>CD</b> </TD>
          </TR>
```

... ..



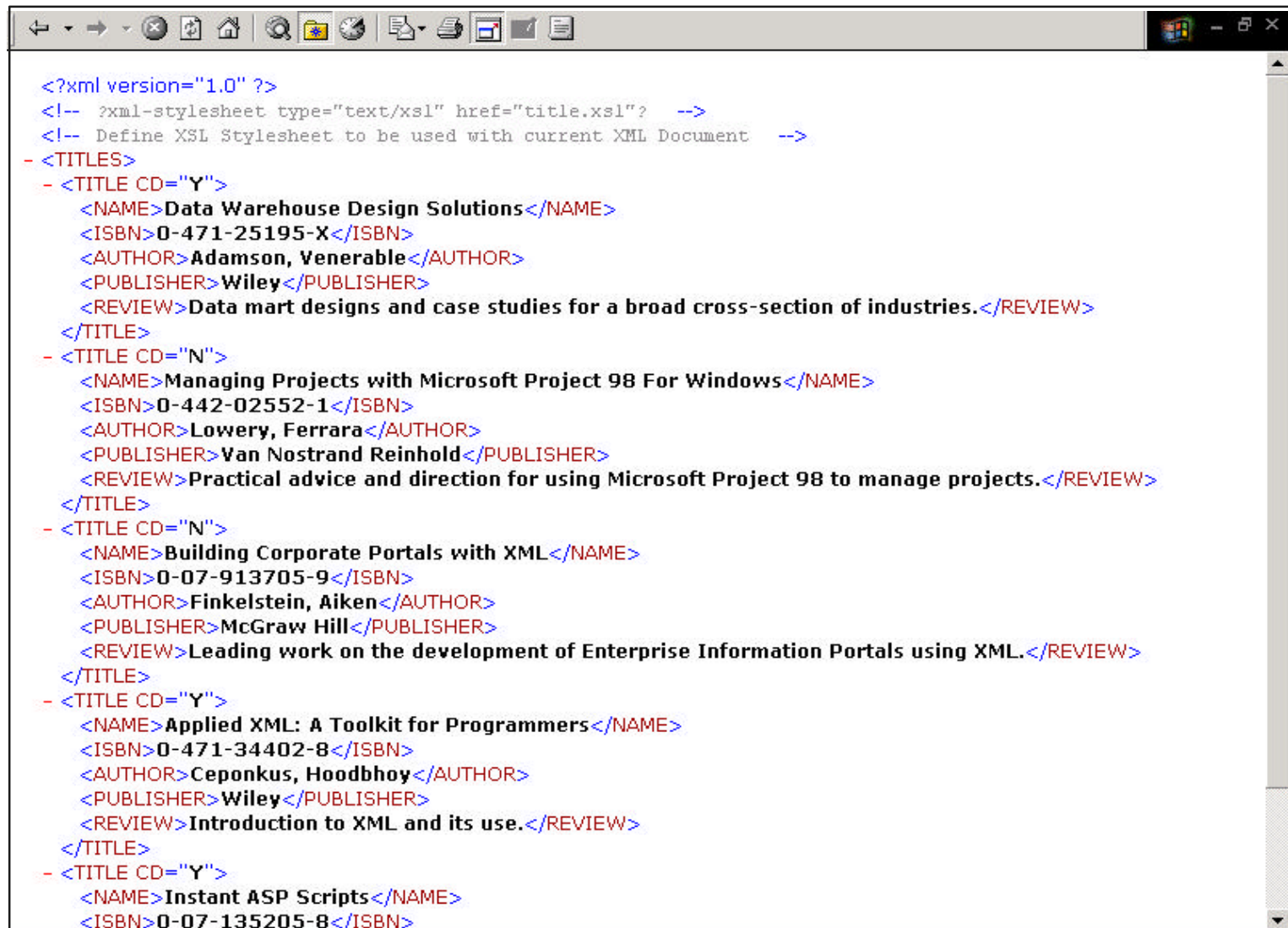
Internet Explorer Examples

XSL Stylesheet

... ..

```
<xsl:for-each select="TITLES/TITLE">
  <!-- set up a loop where for each occurrence of the
    pattern defined in the "select", do the following -->
  <TR>
    <TD> <xsl:value-of select="NAME" /> </TD>
    <!-- "value-of" pulls the value of the contents
      specified in the "select" attribute -->
    <TD> <xsl:value-of select="ISBN" /> </TD>
    <TD> <xsl:value-of select="AUTHOR" /> </TD>
    <TD> <xsl:value-of select="PUBLISHER" /> </TD>
    <TD> <xsl:value-of select="REVIEW" /> </TD>
    <TD> <xsl:value-of select="@CD" /> </TD>
    <!-- use the @ symbol to pull values of attributes -->
  </TR>
</xsl:for-each> <!-- close for-each loop -->
</TABLE>
</BODY>
</HTML>
</xsl:template> <!-- close template tag -->
</xsl:stylesheet> <!-- close stylesheet tag -->
```

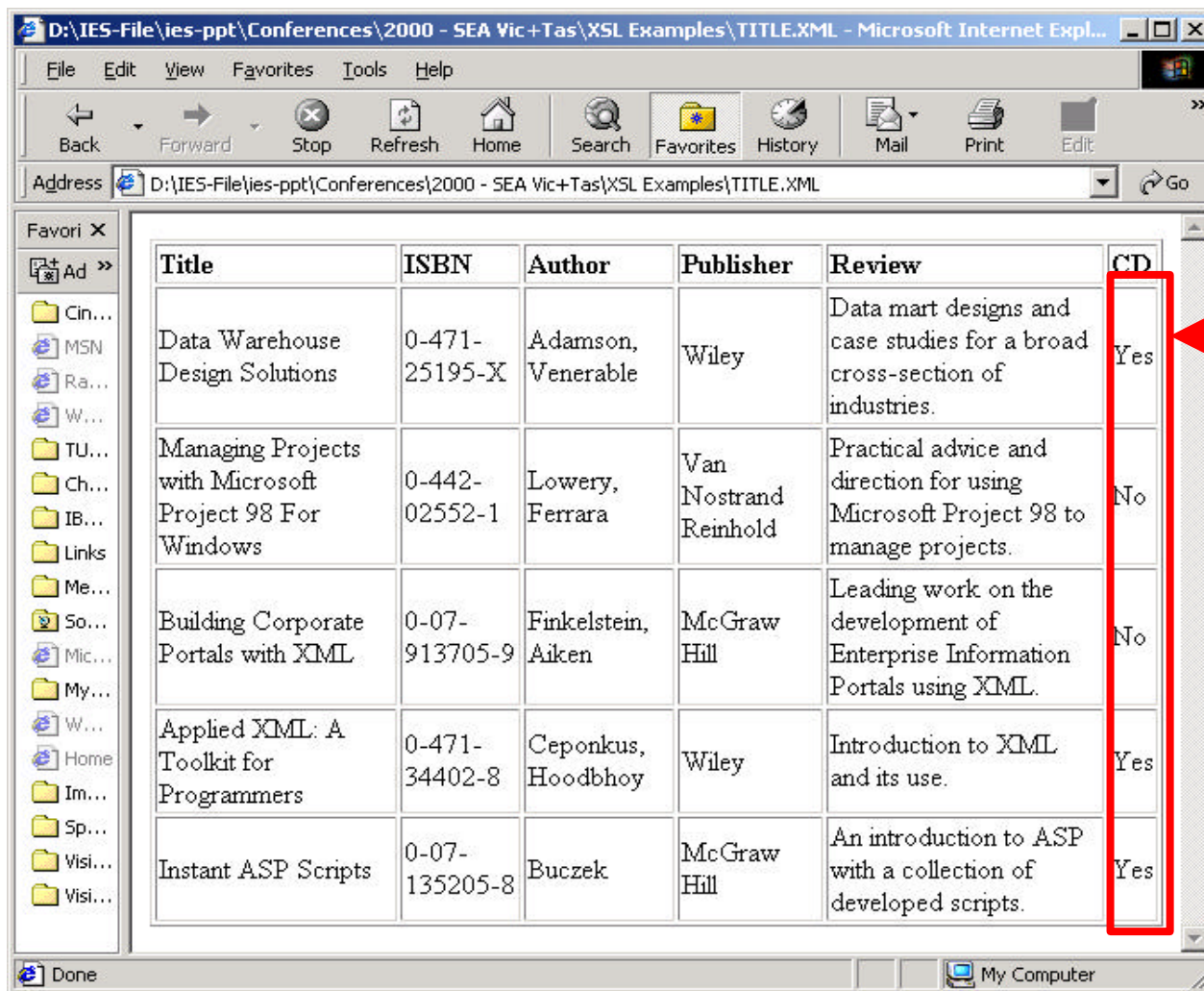

Internet Explorer Examples

A screenshot of an Internet Explorer browser window. The address bar is empty. The main content area displays XML code with syntax highlighting. The code defines an XML document with a root element 'TITLES' containing five book entries. Each entry has a 'TITLE CD' attribute and a 'NAME' element, followed by 'ISBN', 'AUTHOR', 'PUBLISHER', and 'REVIEW' elements. The books listed are 'Data Warehouse Design Solutions', 'Managing Projects with Microsoft Project 98 For Windows', 'Building Corporate Portals with XML', 'Applied XML: A Toolkit for Programmers', and 'Instant ASP Scripts'.

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</TITLE>
- <TITLE CD="Y">
  <NAME>Applied XML: A Toolkit for Programmers</NAME>
  <ISBN>0-471-34402-8</ISBN>
  <AUTHOR>Ceponkus, Hoodbhoy</AUTHOR>
  <PUBLISHER>Wiley</PUBLISHER>
  <REVIEW>Introduction to XML and its use.</REVIEW>
</TITLE>
- <TITLE CD="Y">
  <NAME>Instant ASP Scripts</NAME>
  <ISBN>0-07-135205-8</ISBN>
```


Internet Explorer Examples

XSL Stylesheet with <choose>

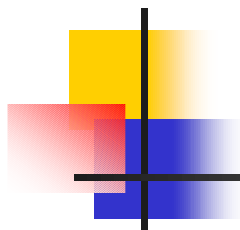


Title	ISBN	Author	Publisher	Review	CD
Data Warehouse Design Solutions	0-471-25195-X	Adamson, Venerable	Wiley	Data mart designs and case studies for a broad cross-section of industries.	Yes
Managing Projects with Microsoft Project 98 For Windows	0-442-02552-1	Lowery, Ferrara	Van Nostrand Reinhold	Practical advice and direction for using Microsoft Project 98 to manage projects.	No
Building Corporate Portals with XML	0-07-913705-9	Finkelstein, Aiken	McGraw Hill	Leading work on the development of Enterprise Information Portals using XML.	No
Applied XML: A Toolkit for Programmers	0-471-34402-8	Ceponkus, Hoodbhoy	Wiley	Introduction to XML and its use.	Yes
Instant ASP Scripts	0-07-135205-8	Buczek	McGraw Hill	An introduction to ASP with a collection of developed scripts.	Yes

Convert:

Y=Yes

N=No



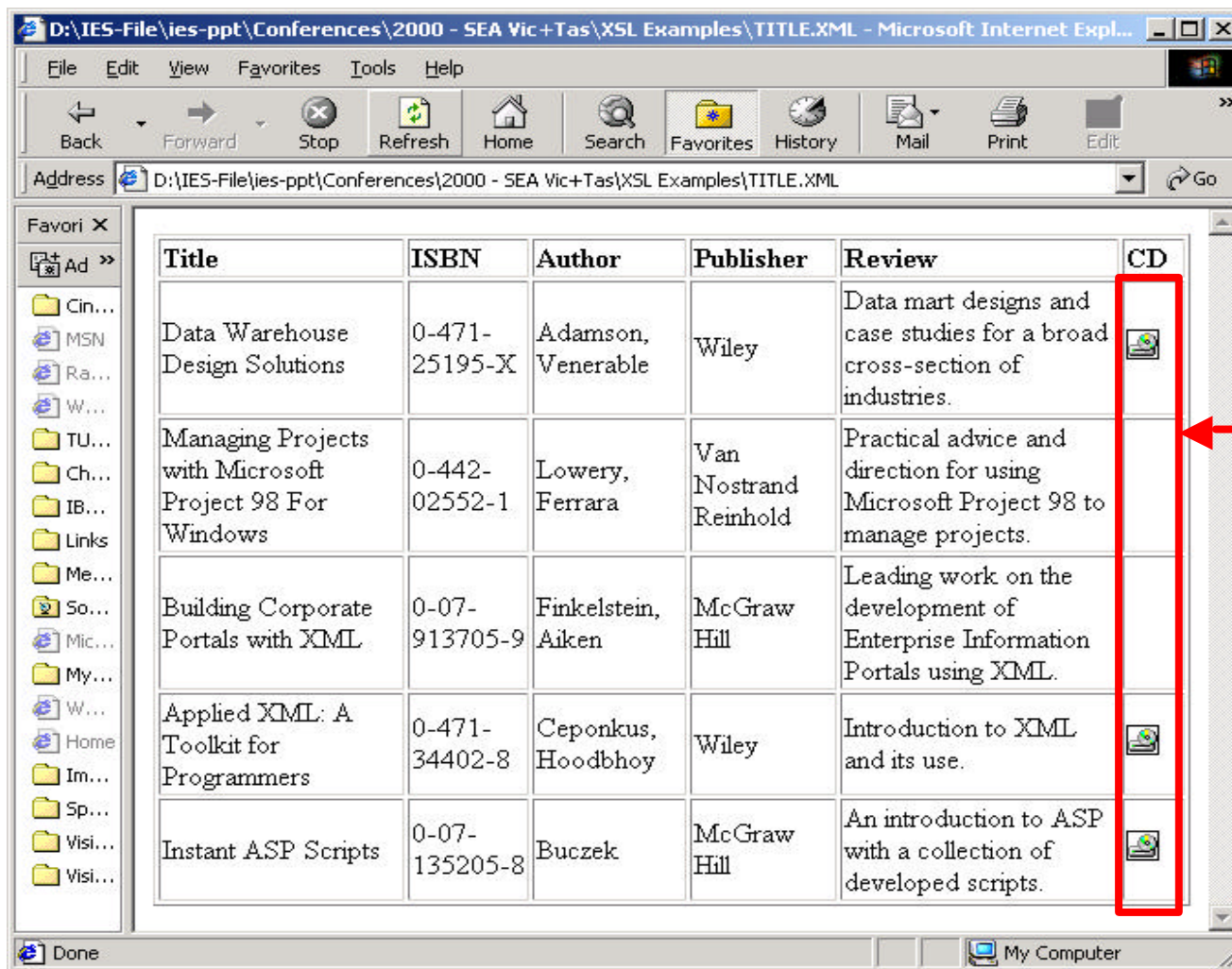
Internet Explorer Examples

XSL Stylesheet

```
<xsl:for-each select="TITLES/TITLE">
  <!-- set up a loop where for each occurrence of the pattern
        defined in the "select", do the following -->
  <TR>
    <TD> <xsl:value-of select="NAME" /> </TD>
    <!-- "value-of" pulls the value of the contents specified in
          the "select" attribute -->
    <TD> <xsl:value-of select="ISBN" /> </TD>
    <TD> <xsl:value-of select="AUTHOR" /> </TD>
    <TD> <xsl:value-of select="PUBLISHER" /> </TD>
    <TD> <xsl:value-of select="REVIEW" /> </TD>
    <TD>
      <xsl:choose> <!-- begin xsl:choose conditions -->
        <xsl:when test="@CD[.='Y']">Yes</xsl:when>
        <!-- each xsl:when case statement has the same "test"
              attribute and syntax as the xsl:if -->
        <xsl:when test="@CD[.='N']">No</xsl:when>
        <xsl:otherwise>Unknown</xsl:otherwise>
        <!-- if none of the cases are met, perform this function-->
      </xsl:choose>
    <!-- close xsl:choose conditions -->
    </TD>
  </TR>
</xsl:for-each>
```

Internet Explorer Examples

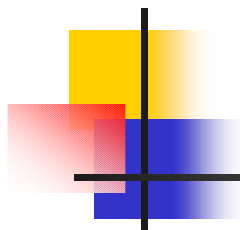
XSL Stylesheet with <choose>



Convert:

***Y=CD
image***

***N=No
image***



Internet Explorer Examples

XSL Stylesheet

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    <TD> <xsl:value-of select="PUBLISHER" /> </TD>
    <TD> <xsl:value-of select="REVIEW" /> </TD>
    <TD>
      <xsl:choose> <!-- begin xsl:choose conditions -->
        <xsl:when test="@CDI.='Y'"> <IMG SRC="cddrive.bmp"
          BORDER="1" > </xsl:when>
        <!-- each xsl:when case statement has the same "test"
              attribute and syntax as the xsl:if -->
        <xsl:otherwise> <IMG SRC="empty.bmp" BORDER="0" >
        </xsl:otherwise>
        <!-- if none of the cases are met, perform this function-->
      </xsl:choose>
    <!-- close xsl:choose conditions -->
    </TD>
  </TR>
</TABLE>
</BODY>
</HTML>
</xsl:template>
</xsl:stylesheet> <!-- close stylesheet tag -->
```