Application Servers
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Session 14 - Main Theme
Upcoming Application Server Technologies

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Agenda

- Continued from Session 13:
  - Microsoft .Net & Web Services
  - Model Driven Architectures
  - Component Development Summary
  - Reflective Application Servers
  - Intelligent Agents
  - Multimedia/Broadband Application Servers
  - Other Component Models Directions
  - Summary
  - Readings
- Take Home Final Assignment
  - Will be posted on 12/10 & due on 12/17 at midnight
  - No extensions
Summary of Previous Session

- Continued from Session 12:
  - EAI and B2Bi Environments
  - MDA Technology
  - XML-Based Secure Messaging
  - Web Services
  - Mainstream UDDI Registries and Browsers
  - Mainstream Services Toolkits
  - Summary
  - Readings

Application Servers Architectures

- Application Servers for Enhanced HTML (traditional)
  - a.k.a., Page-Based Application Servers
  - Mostly Used to Support Standalone Web Applications
- New Generation Page-Based Script-Oriented App. Servers
  - First Generation Extensions (e.g., Microsoft IIS with COM+/ASP)
  - Servlet/JSP Environments
  - XSP Environment
  - Can now be used as front-end to enterprise applications
  - Hybrid development environments
- Distributed Object Computing Platforms
  - Provide an infrastructure for distributed communications enabling
  - Still need to merge traditional web-oriented computing with object computing
- Object Management Architectures
  - DOC Platform + APIs to reusable services and facilities
- OMAs + Component Models -> J2EE, CCM, DNA
- MDAs with XML/Web Services/Channels/B2Bi-Enabling services
- Horizontal & Vertical Extensions
Part I
(continued from Session 13)

Web Services Technology
Microsoft .Net

Also See:
http://www.theserverside.com/resources/article.jsp?l=WebServices
http://www.microsoft.com/net/
http://www.microsoft.com/myservices/services/userexperiences.asp

XML-Based e-Services Protocols and Vendor Architectures

- HP’s NetAction/e-speak platform
- IBM WebSphere Architecture (WSA) platform
- Microsoft .NET platform
- Sun’s Open Net Environment (ONE)
- Oracle’s Dynamic Services platform
- BEA, etc.
.Net XML Support

XML Document Example:

```xml
<Customer>
  <FirstName>John</FirstName>
  <LastName>Doe</LastName>
  <Orders>
    <Order ID="123">
      <OrderDate>6/1/1999</OrderDate>
      <OrderDetail>
        <Title>Number, the Language of Science</Title>
        <Author>David</Author>
        <Price>5.95</Price>
      </OrderDetail>
    </Order>
    <Order ID="456">
      <Title>Tales of Grandpa Cats</Title>
      <Author>Wendy, Lee</Author>
      <Price>6.86</Price>
    </Order>
  </Orders>
</Customer>
```

.DataGrid Example:

![DataGrid diagram](diagram.png)
.Net XML to DBMS Mapping

<table>
<thead>
<tr>
<th>CustomerID</th>
<th>OrderID</th>
<th>OrderDate</th>
<th>CustomerName</th>
<th>TotalPrice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>2023-01-01</td>
<td>John Doe</td>
<td>100.00</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>2023-02-01</td>
<td>Jane Smith</td>
<td>200.00</td>
</tr>
</tbody>
</table>

Built-in Web Services in .Net
.Net Architecture

Visual Studio.NET

.NET Framework .NET Enterprise Servers .NET Building Block Services

.Net Architecture (continued)

Web Services ASP.NET Windows UI

ADO.NET: Data & XML

.NET Framework Class Library

Common Language Runtime
.Net Libraries

System

- Collections
- Configuration
- Diagnostics
- Globlization
- IO
- Net
- Reflection
- Resources
- Security
- ServiceProcess
- Text
- Threading
- Runtime
- InteropServices
- Remoting
- Serialization

.Net Services

System.Web

- Services
  - Description
  - Discovery
  - Protocols
  - Caching
  - Configuration
- UI
  - HTMLControls
  - WebControls
- Security
  - SessionState
.Net Development Environment

Source code
- VB
- C#
- C++

Compiler

Managed code
- Assembly IL Code

Common Language Runtime
- JIT Compiler

Native Code

Operating System Services

. Net ASPX Engine

ASPX Engine

Parse

Generate

Code behind class file

Gen’d page class file

Request

ASPX File

Instantiate

Response

Page class

Instantiate, Process & Render

Response
.Net Events Support

- Parse is loaded, control hierarchy initialized
  - Page_load
  - Textbox1_changed
  - Button1_click
  - Control hierarchy is rendered
  - Page_unload
  - Page is disposed

.Net Integrated ADO/XML Support

- Data Store
- Managed Provider
- XML Reader
- Dataset
- Relational Object Model
- XML
- Class Wrappers
- ISL/T
- Validation
.Net ADO Architecture

.Data ADO Architecture (continued)
.Net XML DOM Support

[Diagram showing the relationship between XmlReader, System.IO.Stream, System.IO.TextWriter, and XmlWriter, with XslTransform, XSLT, XPath, and DataTables concepts]

Implementing XPathNavigator and IXPathNavigable

[Diagram showing the relationship between XmlDocument, XmlDataDocument, and XPathDocument, with DOM, DOM <> DataSet, and Fast XSLT concepts]

.Net XML DOM Support (continued)

[Diagram showing the relationship between XmlDocument, XmlDataDocument, DocumentNavigator, XPathNavigator, DataDocumentNavigator, XPathNavigator, XmlNodeReader, and XmlSchemaCollection]
.Net Web Service Project Creation

![New Project Dialog Box]

A project for creating Web services to use from other applications.

- Project Name: TempConvert1
- Location: Http://MoolcoHost

Project will be created at http://MoolcoHost/TempConvert1.

.Net Solution Explorer

![Solution Explorer]

- Solution 'TempConvert1' (1 project)
- TempConvert1
  - References
  - AssemblyInfo.cs
  - Global.asax
  - Service1.asmx
  - TempConvert1.vsdisco
  - Web.config
.Net Windows Installer Setup

Create a Windows Installer web project to which files can be added.

- Name: TempConvertWebSetup
- Location: C:\Documents and Settings\Administrator\My Documents\Visual Studio Projects\TempConvert\TempConvertWebSetup

Project will be created at C:\(\ldots)\Visual Studio Projects\TempConvert\TempConvertWebSetup.

OK Cancel Help

.Net Project Configuration

Add Project Output Group

- Project: TempConvert1
- Documentation files
- Additional files
- Localized resources
- Debug symbols
- Debug files
- Source files

Configuration: (Active)

Description:

OK Cancel Help
Building a .Net Project

Creating a Sample .Net Client
Creating a Client Form in .Net

Adding a .Net Web Reference
.Net Web Service Runtime Arch.

Visual Studio .Net Home Page
Part II
(continued from Session 13)

**MDA Technology**


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Part III

**Horizontal and Vertical Extensions**
Extended Application Servers

- XML Persistence Extensions (Software AG Tamino, etc.)
  - Simple Doc Storage Systems, Native XML DBs, PDoms, CMSs
    - http://www.rpbourret.com/xml/XMLDatabaseProds.htm
- Reflective Application Servers
  - Reification is the inverse of reflection (e.g., class loader)
  - Structural reflection reifies structural aspects of a program (inheritance/types)
  - Behavioral reflection reifies computation and their behavior
    - http://www4.informatik.uni-erlangen.de/Projects/PM/Java/
    - http://www.dec.unicamp.br/~oliva/guarana/
- Intelligent Agents Support
  - ObjectSpace Voyager (http://www.objectspace.com/products/voyager/)
- Multimedia/Broadband Application Servers

Massively Scalable Distributed Arch.
Massively Scalable Distributed Arch.
(continued)

Part IV

Conclusion
Summary

- .Net is Microsoft new proprietary platform that fully supports the deployment of Web Services
- MDAs that support the specification of architecture model are being developed but they are not yet mainstream products
- Horizontal and vertical extensions to support seamless XML persistence, behavioral reflection (dynamic application server architectures), intelligent agents, and multimedia broadband are being developed and are available as early adopter prototypes/products

Readings

- Readings
  - Handouts posted on the course web site
  - Explore Web Services environments (IBM WSTK, Microsoft .Net, etc.), MDAs, reflective application servers, and application servers based on intelligent agents, and multimedia/broadband extensions
  - Read related white papers/documentation Web Services environments
Project Frameworks

- Project Frameworks Setup (ongoing)
  - Apache Web Server (version 1.3.20, www.apache.org)
  - Perl (version 5.x, www.perl.com), PHP
  - Microsoft IIS with COM+ and ASP (), ChiliSoft
  - Apache Tomcat
  - Macromedia JRun
  - Apache Cocoon 2/XSP
  - Visibroker, Orbacus
  - RMI-IIOP
  - Windows 95/98/NT/2000 or Software AG’s EntireX
  - WebLogic, WebSphere, JBoss, Enhydra, OpenEJB
  - Inprise AppServer, iPlanet.com iPlanet, Sybase EAServer, Oracle 9i, IONA iPortal, Xoology Concerto, Aligo M-1, Advanced Network Systems Weblx
  - GOAL Group OpenCCM, ExoLab.org OpenCCM, iCMG K2-CCM (C++), MICO/E (Eiffel ORB), JavaCCM, TAO Group, IONA iPortal (no CCM), Borland AppServer (no CCM), Sourceforge ME-3 (“Mission Impossible 3”) and CIF projects
  - Microsoft DNA
  - Apache’s XercesJ, XalanJ, XMLSpy, Antenna House XML Formatter, Apache’s FOP, X-smiles
  - JWS, XMI Toolkit, IBM’s Web Service Toolkit
  - POSE, KVM for J2ME, NanoXML
  - IBM Alphaworks WSTK/.Net, XMI Toolkit, EJBMaker, WebMethods, etc.

Assignment

- Explore the references to Web Services-Enabled Application Server technology
- Homework #8: due date is 12/10/03
- Final Assignment: will be handed out on 12/10/03
- Revised Project Proposal: due on 12/19/03 (5-10 PM)
- Final Project Demo: online or in person on 12/15/03 or 12/19/03 (5-10 PM)