Application Servers
G22.3033-003

Session 11 - Main Theme
Upcoming Application Server Technologies

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Agenda

- Continued from Session 10:
  - 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
Summary of Previous Session

- Continued from Session 9:
  - 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 10)

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

`.Net XML Support`

XML Support

.NET XML Support

.NET XML Support
.Net XML to DBMS Mapping

<table>
<thead>
<tr>
<th>Data Tables</th>
<th>Data</th>
<th>Size: 5614 bytes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Customer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OrderDetail</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Results from:

<table>
<thead>
<tr>
<th>Customer ID</th>
<th>First Name</th>
<th>Last Name</th>
<th>Credit Limit</th>
<th>Customer Id</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Bradley</td>
<td></td>
<td></td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>Amy</td>
<td>Hugobottom</td>
<td>5000</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Alvin</td>
<td>Siam</td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

Built-in Web Services in .Net
.Net Architecture

Visual Studio.NET

.NET Framework

.NET Enterprise Servers

.NET Building Block Services

Internet

.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
- UI
  - HTMLControls
  - WebControls
- Caching
- Security
- Configuration
- SessionState
.Net Development Environment

Source code
- VB
- C#
- C++

Compiler

Managed code
- Assembly IL Code
- Assembly IL Code
- Assembly IL Code

Common Language Runtime
- JIT Compiler

Native Code

Operating System Services

Unmanaged Component

.Net ASPX Engine

Request → ASPX File

Parse

Generate

Code behind class file

instantiate

Request → Response

Response

instantiate, process & render

Page class

Gen'd page class file

ASPX File

Engine
.Net Events Support

- Control events
  1. Change events
  2. Action events

-.Net Integrated ADO/XML Support

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

[Diagram of .Net ADO Architecture]

.Net ADO Architecture (continued)

[Diagram of .Net ADO Architecture (continued)]
.Net XML DOM Support

- XmlDocument
- XmlDataDocument

- DocumentNavigator:
  - XPathNavigator

- XslTransform

- XmlNodeReader

- XmlSchemaCollection

- DataDocumentNavigator:
  - XPathNavigator

- Implements XPathNavigator and IXPathNavigable

- Data Stores

- XSLT
- XPath

- XmlReader
- System.IO.Stream
- System.IO.TextWriter
- XmlWriter
.Net Web Service Project Creation

![Image of .Net Web Service Project Creation](image)

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

- **Names:** TempConvert1
- **Location:** http://localhost/TempConvert1

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

.Net Solution Explorer

![Image of .Net Solution Explorer](image)

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

![Windows Installer Setup window]

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

**TempConvert1WebSetup**

Location: C:\Documents and Settings\Administrator\My Documents\Visual Studio Projects\TempConvert1\TempConvert1WebSetup

Project will be created at C:\\(Visual Studio Projects\\TempConvert1\\TempConvert1WebSetup.

OK Cancel Help

.Net Project Configuration

![Project Configuration window]

Add Project Output Group

**TempConvert1**

- Documentation files
- Portable files
- 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 10)

MDA Technology

Also See http://www.omg.org/mda, and associated Webcast,
Session 9 handout on “Application Modeling Using XML”
and
http://www.ics.uci.edu/pub/arch/xarch/

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](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://www4.informatik.uni-erlangen.de/Projects/PM/Java/)
  - [http://www.decc.unicamp.br/~oliva/guarana/](http://www.decc.unicamp.br/~oliva/guarana/)
  - [http://www4.informatik.uni-erlangen.de/TR/pdf/TR-I4-97-10.pdf](http://www4.informatik.uni-erlangen.de/TR/pdf/TR-I4-97-10.pdf)

Intelligent Agents Support


Multimedia/Broadband Application Servers


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

Traditional Architectures
Vertical Integration

Application A
Operating Environment A
Hardware A

Application B
Operating Environment B
Hardware B

Application C
Operating Environment C
Hardware C

Amosphere Architecture
Open Integration

A B C ... n
Open Services & Application

Amos
Open Operating Environments

A B C ... n
Generic Hardware

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
  - Apache Tomcat
  - (Macromedia JRun)
  - Apache Cocoon 2/XSP
  - Visibroker, Orbacus
  - RMI-IIOP
  - WebLogic, WebSphere, JBoss
  - ExoLab.org OpenCCM
  - 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 #1-4: final due date is 12/07/09
- Revised Project Proposal: due on 12/14/09
- Final Project Demo: online or in person no later than 12/23/09 (5-10 PM)