B211 Internet Computing

Web Service Development Frameworks

Lecture Outline

- What are web services?
- Major web service development frameworks:
  - SUN's Open Network Environment (ONE)
  - Microsoft's .NET
  - IBM's Web Service Development Environment

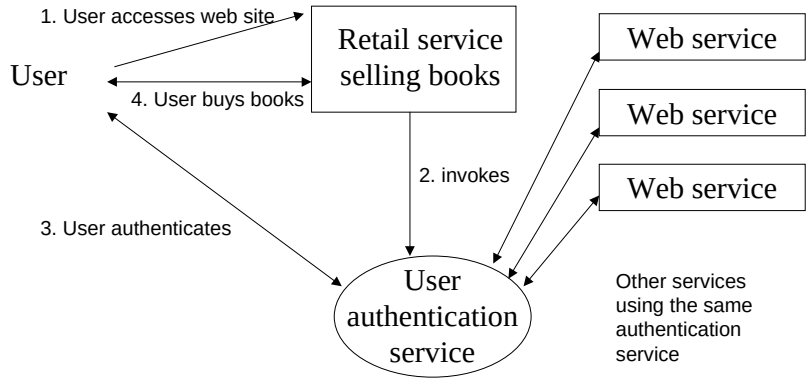
Web Services

- At our current stage of web evolution, more and more developers are moving towards developing *web services*.
- This is one step further than just providing web content or information.
- Also, services is not just about one-level web-site to web user interaction, we are also building services that can be put together and used to form more complex services.

Services building Services

- Some examples of generic services we can use to integrate into a larger service
  - user authentication
  - currency conversion,
  - language translation,
  - shipping and claims processing

An example: sites using a user authentication service



Support for Web Services

- To enable the diagram in the previous page to work, a few standards are being developed to enable communications between services:
  - XML and SOAP (Simple Object Access Protocol)
    - mechanism for passing information.
  - UDDI (Universal Description, Discovery and Integration) directory services
    - Allows businesses to discover existing services (manually, or automatically by software) and define how they interact over the web.
  - WSDL (Web Services Definition Language)
    - Language used to describe *what* a web service can do, *where* it resides, and *how* to invoke it.

Web Service Development Framework

- When we talk about a web service ***development framework***, it encompasses a whole vision of many components:
  - Languages that are used to build the web sites and develop the applications.
  - Support tools used to create the sites and develop the applications
  - Software supporting communications between services, such as for standards in the previous page.
  - Servers and client hardware and software for various purposes (web servers/browsers, database servers, email servers, etc)
  - etc.

Microsoft's .NET Framework

- .NET is a model targeted towards migrating Microsoft's focus on desktop-based software towards Internet-based software.
- Based on XML as the basis for data exchange.
- Most of the information on the framework is still only promotional material, as a catch-cry for the company's advertising.
- More and more products will be released in the future tied to .NET.

Components of .NET

- The plans for different parts of the .NET initiative:
  - Tools for software developers
    - » Visual Studio .NET
    - » the .NET Framework (consisting of ADO, ASP, C#, etc)
    - » Microsoft Windows .NET (the operating system).
  - .NET Enterprise Servers
    - » where all the data will reside and be served from
  - Services.
    - » Eg. Passport .NET for user authentication
  - User experience on multiple devices
    - » especially wireless

Current .NET Software

- Most of the .NET software are still in their early stages of release:
  - Visual Basic .NET
  - Visual Studio .NET Beta 1
  - BizTalk Server
  - SQL Server
  - etc
- All .NET products currently released are still MS-platform dependent.
  - The industry is waiting for future products that demonstrate the current claim that .NET will be an open **platform-independent** framework.

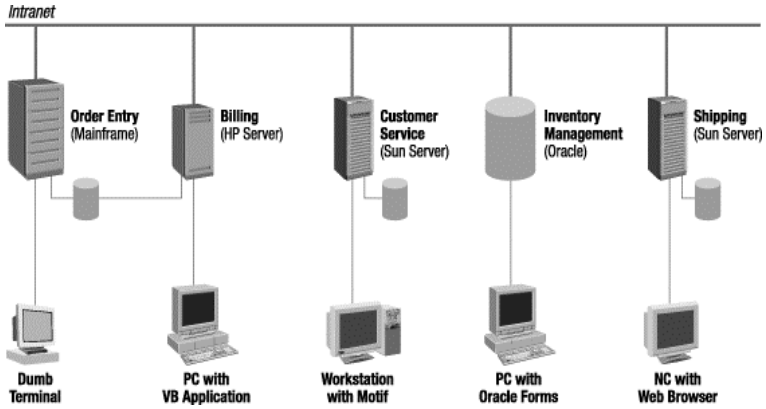
Sun's ONE Integration

- Sun's future vision of web services in the future is based on it's Open Net Environment (ONE) initiative.
- The ONE approach is also based on communicating information using XML.
  - Application interfaces, implemented as either servlets or JavaServer Pages (JSP), contain code that manipulates XML messages and converts them into Java to give to back-end applications that actually implement the organizational processes.

Web Service Development Support at SUN

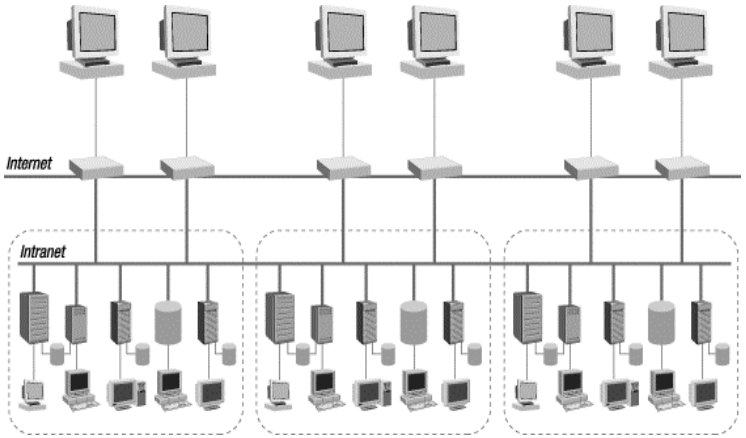
- Emphasis on open standards.
  - Less developments tied to their Solaris OS and proprietary servers.
- Heavy promotion of developments tying XML with Java technologies
  - SUN has many of its products based on Java
  - Also, more customers moving to Java-based technologies means less customers using Microsoft-based products (which do not run on SUN hardware)

Current Environment



From http://www.sun.com/dot-com/sunjournal/v5n1/feature2.html

Current Environment



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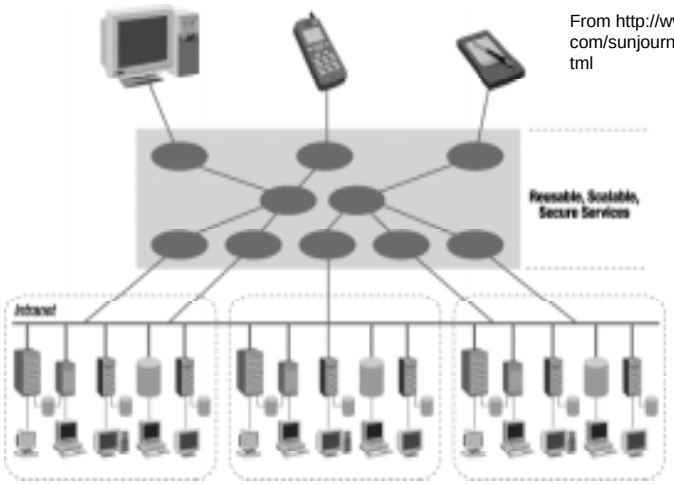
Sun's Vision of the Future



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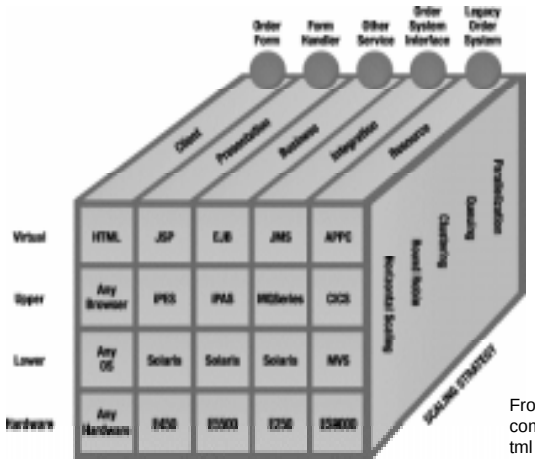
Sun's Vision of the Future

- What they don't mention of course is that they want:
  - All the "reusable, scalable, secure services" to be Java-based technologies.
  - All the underlying servers to reside on Sun server hardware - their main source of income.

Sun's 3-D Framework for web services



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ONE vs .NET

- These are the two biggest initiatives in the industry today to lock Internet service and application developers into one environment.
- At the moment, Microsoft's .NET products are still at their early stages and are relatively immature, while SUN's J2EE (which ONE is based on) have been extensively used.
  - SUN have focused on network application development a lot more than Microsoft has.
  - This will no doubt be challenged now that Microsoft changed its focus and picks up steam in this area.

IBM's WSDE

- IBM also has a significant framework for web service development.
- The **IBM Web Services Development Environment** (WSDE) contains tools to:
  - Create/Transform
    - Use XML editing functions to develop new Web services.
  - Build
    - Wrap existing components so that they can be exchanged using object-oriented distributed technologies (such as SOAP)
  - Deploy
    - Deploy the Web service on the developer's machine or to a remote, production-level server for testing right away.

IBM's WSDE

- Test
  - Test applications as they run locally or remotely, and get instant feedback.
- Future versions of WSDE also plans to include tools to:
  - Discover
    - Browse the UDDI Business Registry to locate existing Web services for integration.
  - Publish
    - In addition to creating and deploying Web services, the development environment can also publish them to the UDDI Business Registry.

IBM's Web Service Tools

- The principle tool released by IBM is their XML4J development kit.
- Their direction is to also add support to their principal web server, WebSphere.

Further Reading

- Introduction to web service frameworks:
  - http://www.xml.com/pub/a/2001/04/04/webservices/index.html
  - http://www.theserverside.com/resources/articles/WebServices/article.html
- Sun's ONE
  - http://www.sun.com/sunone/
- Microsoft's .NET
  - http://msdn.microsoft.com/library/default.asp?url=/nhp/Default.asp?contentid=28000519
- IBM's WSDE
  - http://www.alphaworks.ibm.com/tech/wsde

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