UNITE 2004
Technology Conference

Web Services: Concepts, Considerations and Implementation

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Session EWOS 4054
1:30pm – 2:30pm
Wednesday, September 22, 2004

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MGS, Inc.

- Software Engineering, Product Development & Professional Services firm founded in 1986
- We provide products and services to solve business problems:
  - Software Engineering Services
  - Professional Services
    - Management Support Services
    - Consulting and Technical Services
    - Application Development Services
    - Training Services
  - Product Development

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Web Services

- In this presentation you will learn about …
  - What are Web Services?
  - Implementation requirements
  - Planning considerations and Impact on existing applications
  - Why use Web Services?

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Web Services

What are Web services?

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Web Services – The Vision

- Goal
  - Make Internet program-to-program exchanges as easy as browsing the Web

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Web Services – The Vision

- Internet based
- Universal directory
  (like TCP/IP host name services)
- “Loose Coupling” between service provider and service consumer
  - Anonymous client
  - Service discovery
  - Flexible data content
  - asynchronous
- Create a world-wide fabric of computing services (and commerce)
- Assemble applications from available services

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Web Services – The Reality

- Mission critical applications cannot depend on:
  - the Internet
  - “vended” services
  - the hope that someone is vending needed services
  - the hope that “vended” services operate exactly as the business requires
  - the hope that the “vended” services are reliable
- Business interfaces do not benefit from:
  - Dynamic service discovery
  - Data flexibility

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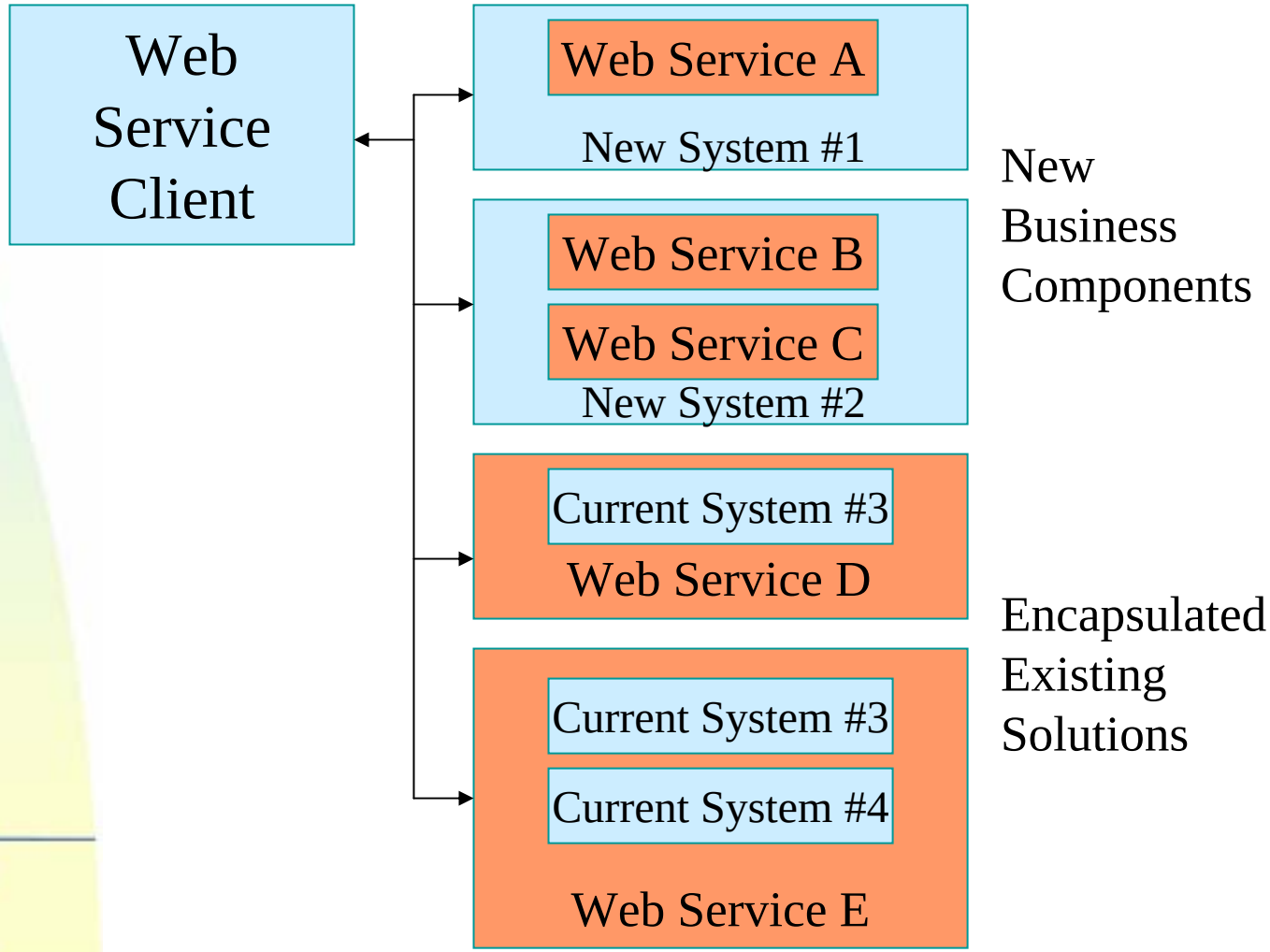
Web Services – The Reality

- The Web Services concept contains extremely powerful elements:
  - Simple, well-defined, standards-based interface
  - Technology independent implementation
  - Each set of services has a description file
  - Integrated directory of service descriptions and documentation
  - Provides the ability to:
    - Componentize new Enterprise business functions
    - Encapsulate existing business functions for easier access

Web Services – The Reality



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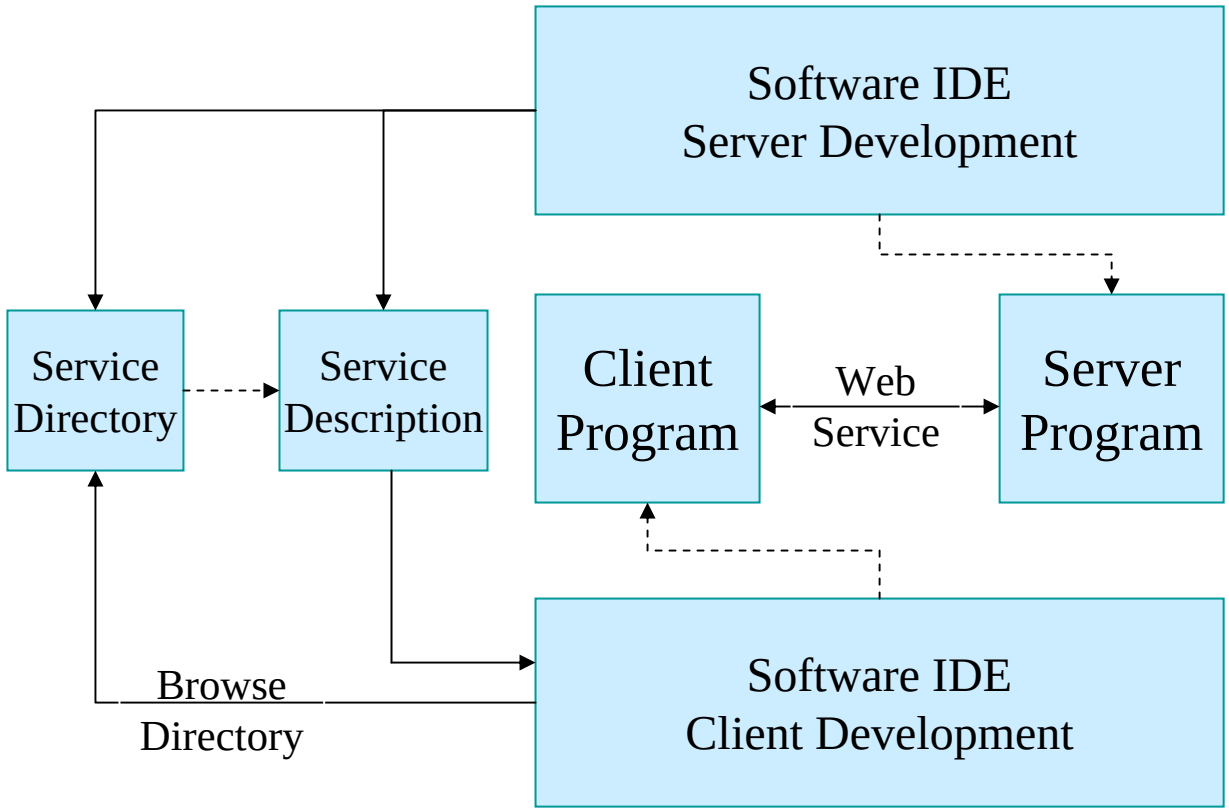
Web Services – The Reality

- Supported by software IDEs
  - Discovery of service (optional)
  - Automatic creation of Web Services client objects
  - Web Services Server object support
    - Description file generation
    - Directory update
    - Server program code

Web Services – The Reality



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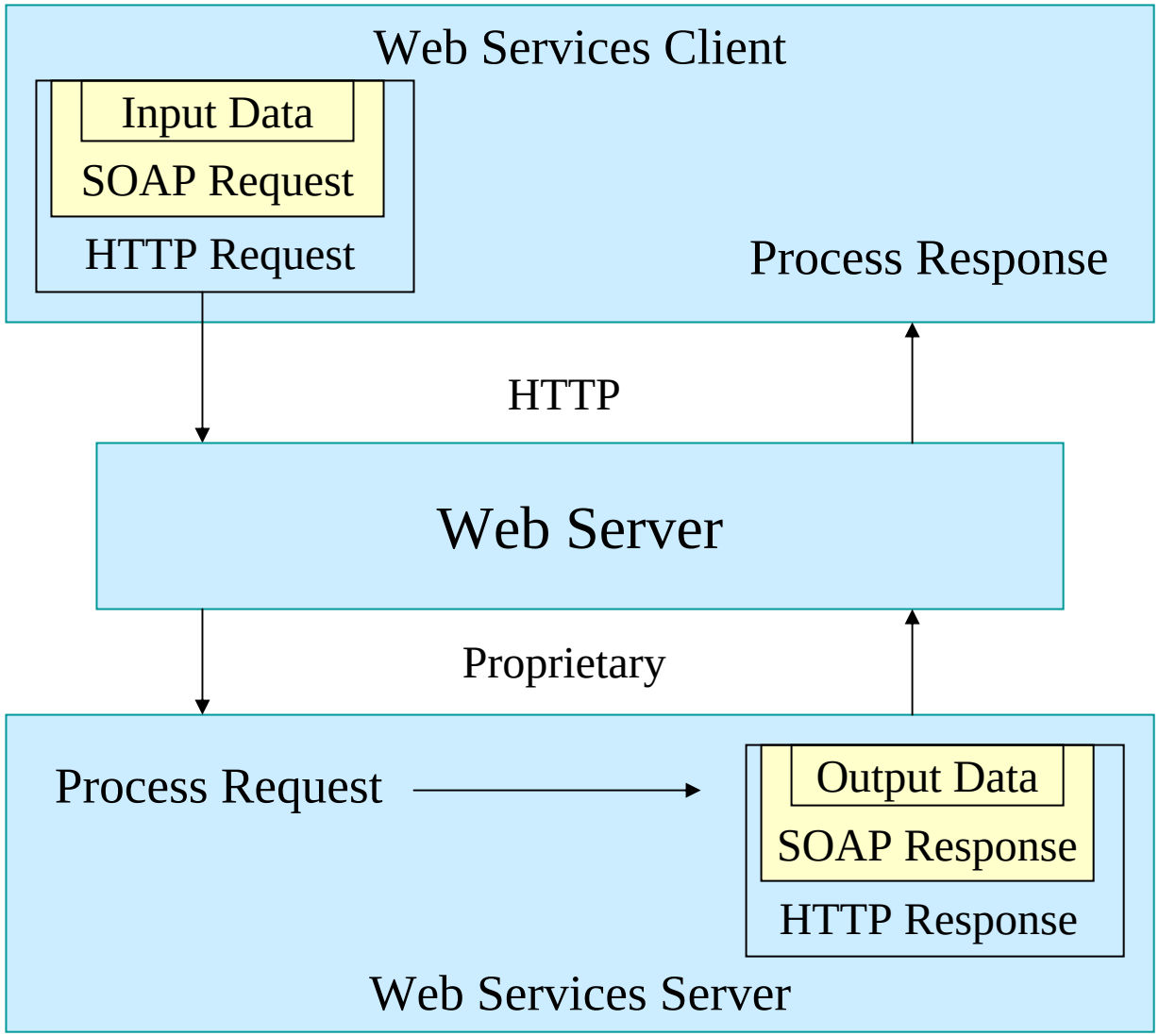
Web Services – Technology

- Web Services is built on Internet communications standards
  - **HTTP –** HyperText Transfer Protocol
  - **SOAP –** Simple Object Access Protocol
  - **XML –** eXtensible Markup Language
- Web service is addressed with the server's URI obtained from the Web Services Description Language (WSDL) file

Web Services – Technology

Indicates XML Encoding



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Web Services – Technology

SOAP Request:

```
<soap:Envelope>
  <soap:Body>
    <tns:WSTEST_SCRN01>
      <Trancode>SCRN01</Trancode>
      <InputData>lower case letters</InputData>
    </tns:WSTEST_SCRN01>
  </soap:Body>
 </soap:Envelope>
```

SOAP Response:

```
<soap:Envelope>
  <soap:Body>
    <tns:WSTEST_SCRN01Response>
      <Trancode>SCRN01</Trancode>
      <InputData>LOWER CASE LETTERS</InputData>
      <statusLine />
    </tns:WSTEST_SCRN01Response>
  </soap:Body>
 </soap:Envelope>
```

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What do I need to do to implement Web Services?

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Web Services- Terminology

- **UDDI**
  - Universal Description, Discovery and Integration
  - Description of Web Service
  - UDDI specifies WSDL location with a URI
    - Web server host name
    - WSDL file name
- **WSDL**
  - Web Services Description Language
  - XML description of the Web Service
  - URI of service (host and service name)

Web Services- Terminology

WSDL File Excerpt:

```
<message name="WSTEST_SCRN01">
  <part name="Trancode" type="xsd:string" />
  <part name="Input_data" type="xsd:string" />
</message>
<message name="WSTEST_SCRN01Response">
  <part name="Trancode" type="xsd:string" />
  <part name="Input_data" type="xsd:string" />
  <part name="statusLine" type="xsd:string" />
</message>

<service name="COMSWebServices">
  <documentation>Access COMS applications via Web Services
  </documentation>
    <port name="WSTEST" binding="wsdl:WSTESTHttpBinding">
    <soap:address location="http://laptop1mcp/COMSWebServices/" />
    </port>
</service>
```

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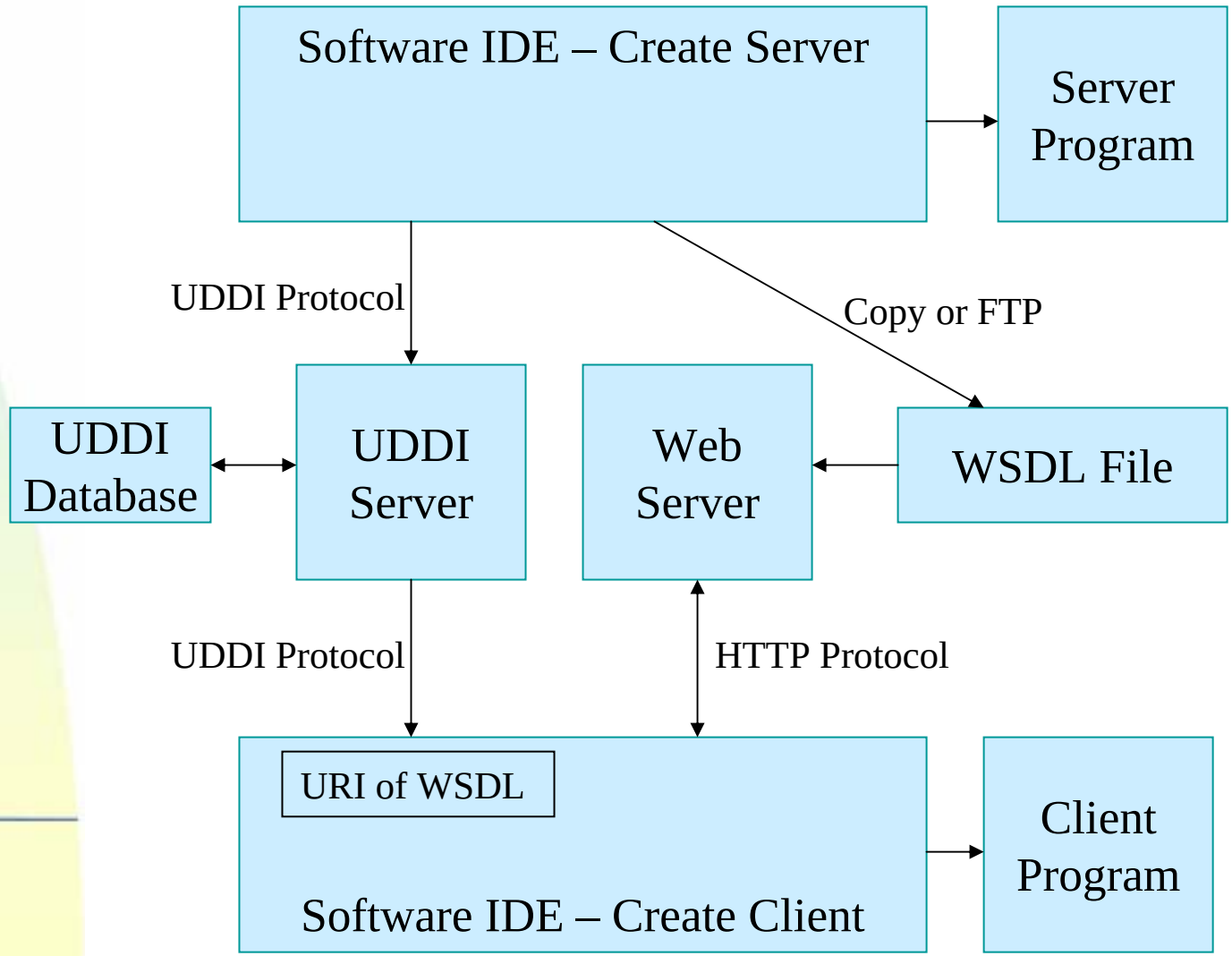
Web Services – Development

- An IDE that supports:
  - Defining a Web Service
  - Generating a WSDL
  - Creating a server application object
  - UDDI browser (optional)
  - Ability to create a client application object from a WSDL
- Web server to serve up the WSDL
- UDDI Server to catalog available Web Services (optional)

Web Services- Development



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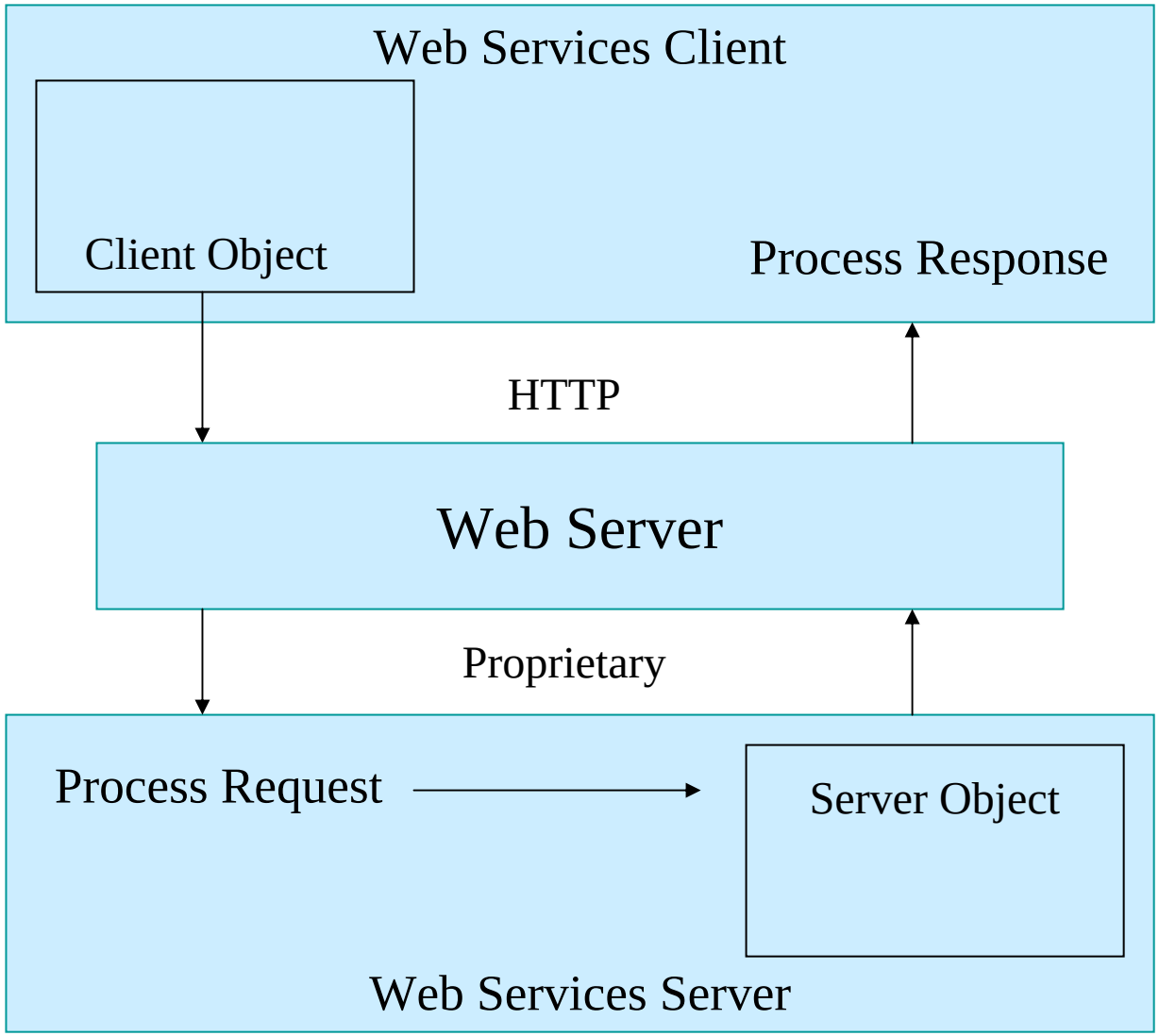
Web Services - Runtime

- Runtime components:
  - Client application program
  - TCP/IP link to Web Server
  - Web server supporting HTTP or HTTPS protocol
  - Server application program

Web Services – Technology



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What are the planning considerations and the possible processing impact?

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Web Services - Planning

- What IDE will you use?
  - Client
  - Server
- Clearly Identify where processing will be located
  - WSDL server
  - Web Server
  - Soap Processor
  - Back-end support
- Is everything compatible

Web Services - Planning

- Define practical “new“ services
  - Reusable
  - Flexible
  - Logical request input fields
  - Reasonable data output volume
  - Reasonable response time
  - Stateless (if possible)
- Establish an “interface” that you can live with for a while

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Web Services - Planning

- Encapsulation of existing on-line applications
  - Difficult to implement on a one-for-one bases
  - Based on transaction “interception”
  - Make sure “intercept” captures all processing
  - Often not “dense” enough

Web Services - Planning

- Plan for Multiple Processing Regions
  - Production, Development, QA
  - Will client application access just one or all regions?
  - Plan to provide support for all regions operating simultaneously

Web Services - Planning

- Legacy Applications:
  - Totally Transparent
    - Web Service looks to application like an existing on-line or batch transaction
  - Aggregated Existing
    - Web Service looks like a sequence of existing transactions
  - New Implementation
    - New interface implemented to support Web Services

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Web Services - Planning

- Considerations:
  - Will processing volume increase for the same work?
  - Will application/database locks be held longer?
  - Will SOAP/XML processing add significant processing?
  - Increased network traffic

Web Services - Planning

- Security
  - Applied before the SOAP processor
    - VPN or Encrypted Router
    - SSL
    - MS Web Services Extensions
  - Session
    - Non-stateless
    - Requires logon WS exchange
    - Each WS call contains a security token

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Why would I want to use Web Services?

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Web Services- Business Case

- Simpler and more flexible then "open" transaction protocols
  - **EDI – Electronic Data Interchange**
  - **DTP – Distributed Transaction Processing (OLTP)**
- Not technology dependent
  - **RPC – Remote Procedure Calls**
  - **DCOM – Distributed Component Object Model**
  - **RMI – Remote Method Invocation**
  - **CORBA – Common Object Request Broker Architecture**

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Web Services- Business Case

- Built on proven Internet communications standards
  - **HTTP – HyperText Transfer Protocol**
  - **SOAP – Simple Object Access Protocol**
  - **XML – eXtensible Markup Language**
- Includes service description and service directory
  - **WSDL – Web Services Description Language**
  - **UDDI – Universal Description, Discovery and Integration**

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Web Services- Business Case

- Supported by software IDEs
  - Discovery of service
  - Automatic creation of Web Services client objects
  - Web Services Server object support
    - WSDL generation
    - UDDI update
    - Server program
  - Included as part of the application framework
    - Microsoft .NET
    - Sun Microsystems J2EE
    - Unisys EAE

Web Services- Business Case

- Abstracts out business functionality
  - Creates machine (technology) independent functionality
  - Indirect reference to service
  - Trivial to re-locate the business function or functions
  - Improved scalability
  - Improved ability to re-host

Web Services- Business Case

Programs Worldwide in 2001 (in millions)

	Custom Applications	Application Packages
Total	87.2	5.6
Windows	5.9	0.4
UNIX	15.7	1.0
Other	65.5	4.2

Aberdeen Group, February 2002

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Web Services- Business Case

- Leverage existing business functionality
  - Rewrites are expensive
  - Redesigns are even more expensive
  - Placing a Web Services envelope around existing functionality is relatively inexpensive
  - Preserves investment in known, reliable business solutions

Web Services- Business Case

- Use proven Web Services elements to solve business problems
  - Organize IS services
    - **Description of each service**
    - **Directory of services**
  - Implement functionality shared between dissimilar systems
  - Provide well defined interfaces between business units
  - Leverage existing functionality
  - Not dependent on proprietary technology
  - Ease of use (IDE support)
- Standard warning …. don't implement technology for technology's sake

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Web Services- Business Case

- Languages for defining business processes based sequences of individual Web Services
  - **Microsoft/IBM – BPELAWS (Business Processing Execution Language for Web Services)**
  - **Sun – WSCI (Web Services Choreography Interface)**
- Web Services will become a requirement for systems to ***participate*** in the Enterprise just as TCP/IP has become a requirement for systems to ***communicate*** within the Enterprise

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Web Services- Business Case

“[by using Web Services] developers must consider how to build more modular components, how to share data across otherwise disparate sources , and ultimately, how to create applications out of these components and data sources.”

- Infoworld June 10, 2002

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Additional Questions?

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