

Microsoft .NET and XML Web Services

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Agenda

- **Microsoft .NET**
 - The what, why, and how?
- **XML in .NET**
- **Web Services in .NET**
- **Wrap-up**

- **Slides available at Microsoft Finland presentation archive**
(<http://www.microsoft.fi>)
- **For questions kimmob@microsoft.com**

Technology requirements

- **Computing power**
 - Doubles in 18 months
 - Scalability of Intel/PC Servers
- **Everything is networked**
 - Cheap and available Internet
 - Wireless
- **Multitude of devices**
 - PDA, mobile phone, PC, laptop, TV, toaster, gas pump...
- **Internet Standards**
 - XML, ...



What is .NET?

- **.NET is Microsoft's new architecture for developing applications on top of Windows and the Microsoft product line**
- **.NET is the new implementation of Windows DNA**

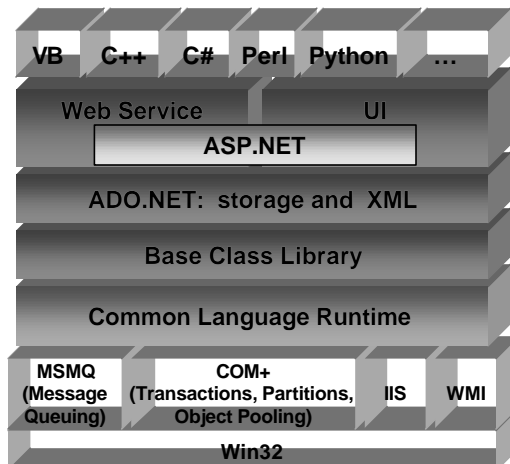
.NET – Why?

- **Technology requirements**
 - Integration
 - New application types
 - New user interfaces
- **Developer requirements**
 - RAD – ease of app development
 - Support for many languages...
 - ...but – shared features and the same deve environment
- **Windows DNA**
 - Has been developed during a long time
 - Lots of features == Complex?

Microsoft .NET

- **New application development environment**
 - Windows Apps (PC/other devices)
 - Web/Internet/intranet
 - Web Services
- **Standards in a central role**
 - XML etc.
 - Web Services
- **Enhance developer productivity**
 - Choose any language
 - Shared libraries
 - Shared dev environment
 - Language neutral
 - All development in the same
 - language
 - class library
 - dev tool

.NET Framework



Shared class libraries

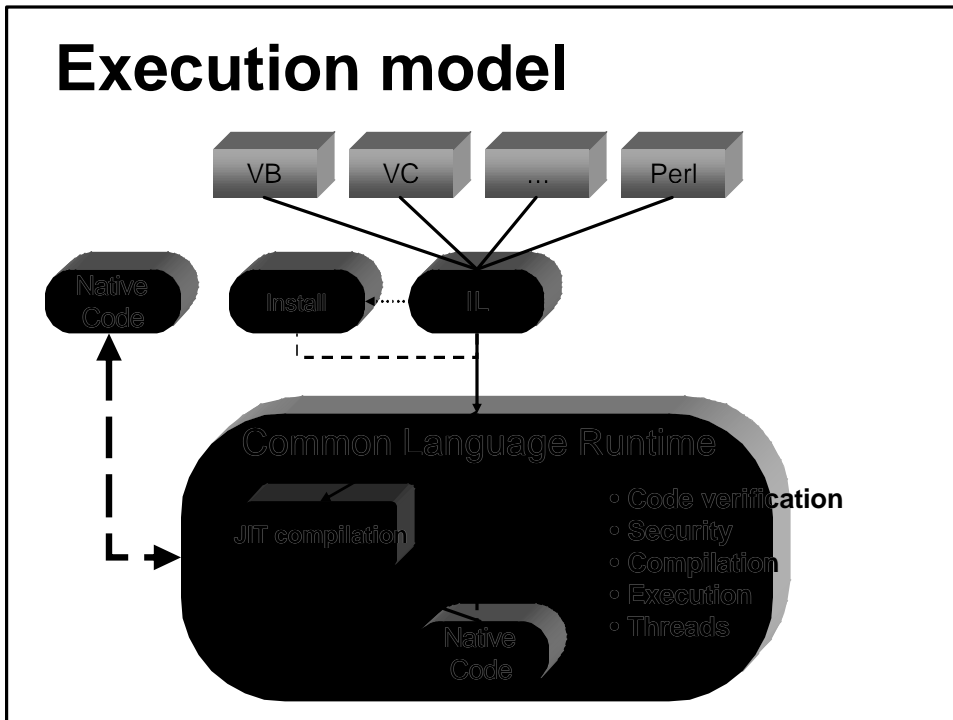
- ◇ Same programming model from one language to the other
- ◇ Integration between languages
- ◇ Extensibility
- ◇ Tools

ASP.NET

- ◆ Web Services and Web UI's

Common Language Runtime

- ◆ Basic functionality: program compilation and execution, memory management, security



Support for many languages

- **.NET is language neutral**
 - All .NET languages are equal
 - Integration between languages
 - One dev environment
- **Microsoft languages**
 - Visual Basic®, C++, C#, J#, JScript®
- **Third parties**
 - APL, COBOL, Eiffel, Fortran, Haskell, ML, Perl, Python, RPG, Scheme, Smalltalk, ...

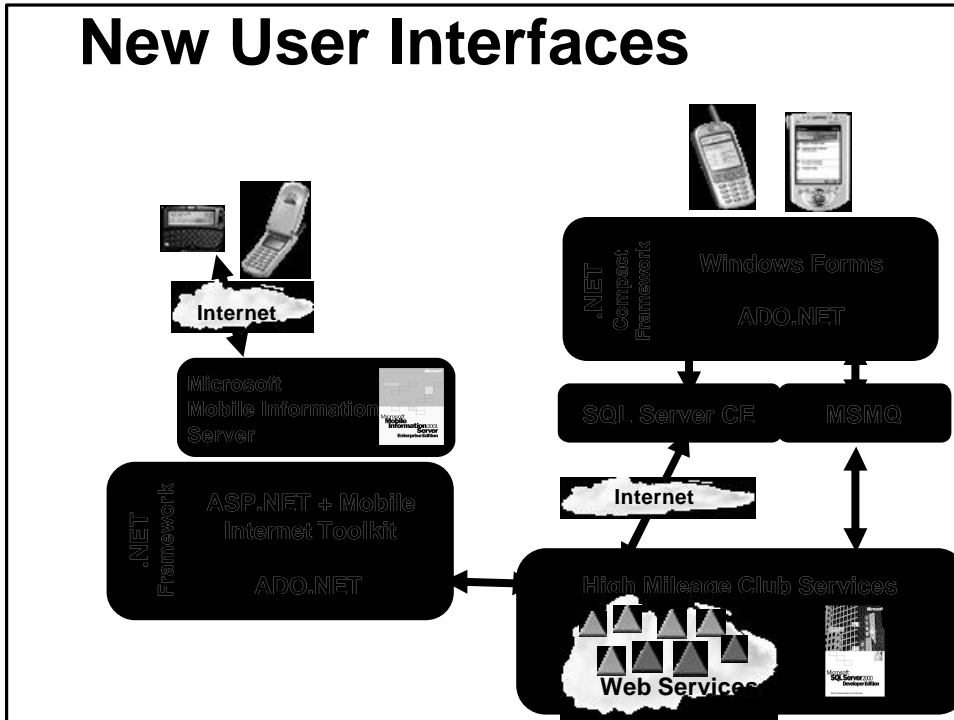
.NET Framework class library

- **Used in all .NET languages**
 - Even though the class library is mostly written in C#...
 - ...it can be used in any .NET language
- **Shared between dev environments**
- **Arranged in a single namespace**
 - (Almost) all under System.
- **Contains:**
 - ASP.NET
 - ADO.NET
 - Windows Forms
 - etc...

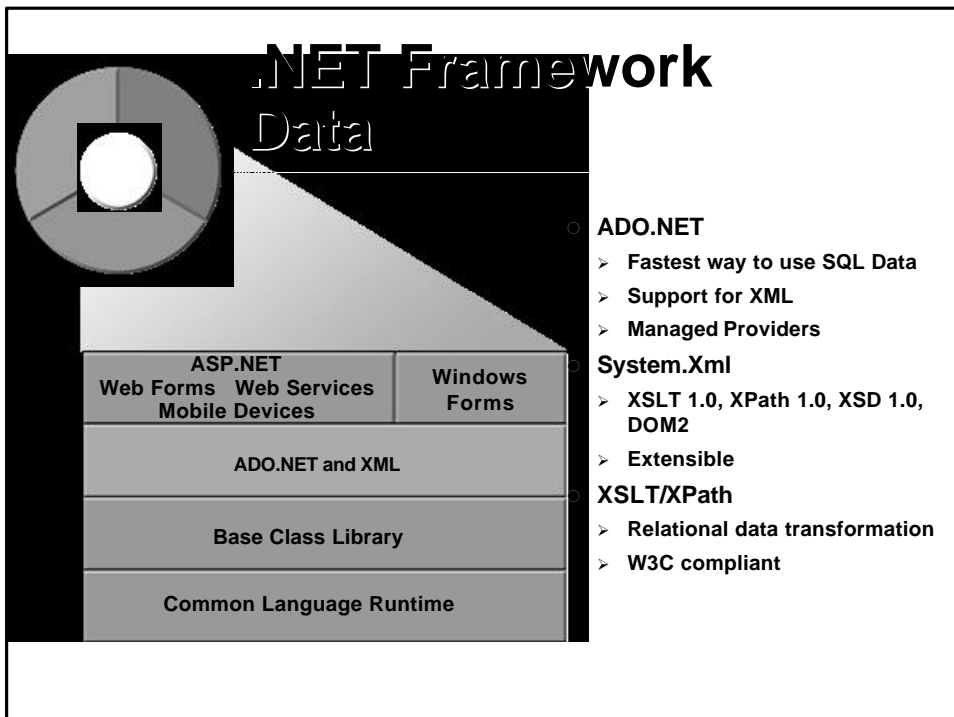
User Interfaces

- **Four different .NET UI's**
 1. "Traditional" Windows App
 2. "Mobile" Windows App
 3. "Traditional" Web UI
 4. "Mobile" Web UI
- **Others**
 - Functionality through Web Services...
 - ...and the UI can be almost anything and anywhere, on any device!

New User Interfaces



.NET Framework Data

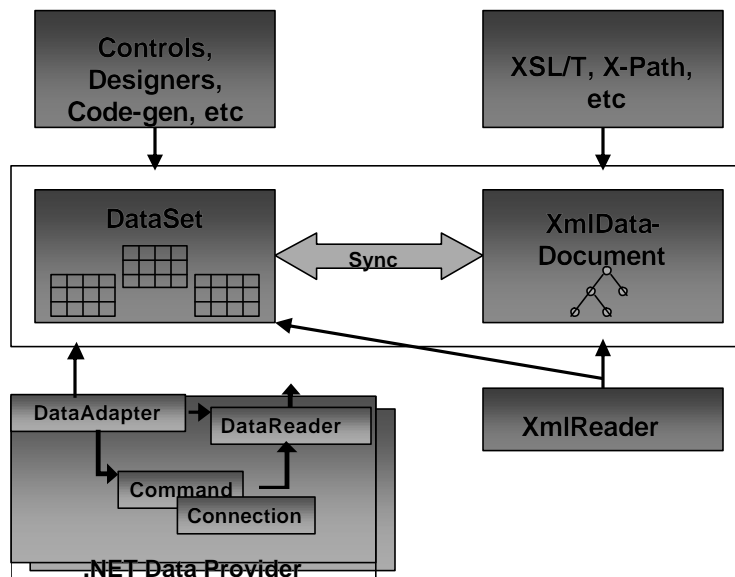


- ADO.NET
 - Fastest way to use SQL Data
 - Support for XML
 - Managed Providers
- System.Xml
 - XSLT 1.0, XPath 1.0, XSD 1.0, DOM2
 - Extensible
- XSLT/XPath
 - Relational data transformation
 - W3C compliant

.NET Supports XML!

- XML 1.0
 - <http://www.w3.org/TR/1998/REC-xml-19980210>
- XML Namespaces
 - <http://www.w3.org/TR/1999/REC-xml-names-19990114/>
- XML Schemas
 - <http://www.w3.org/TR/2001/REC-xmlschema-1-20010502/>
 - <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>
- XPath expressions
 - <http://www.w3.org/TR/1999/REC-xpath-19991116>
- XSL/T transformations
 - <http://www.w3.org/TR/1999/REC-xslt-19991116>
- DOM Level 1 and Level 2 Core
 - <http://www.w3.org/TR/1998/REC-DOM-Level-1-19981001/>
 - <http://www.w3.org/TR/2000/REC-DOM-Level-2-Core-20001113/>
- SOAP 1.1
 - <http://msdn.microsoft.com/xml/general/soapspec.asp>

XML and data



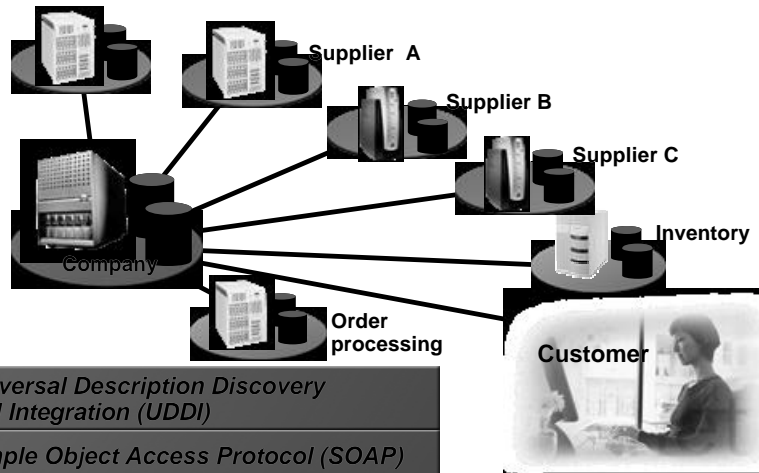
XML and .NET

- **XML used heavily in .NET**
 - **Object serialization format**
 - for example DataSet
 - **.NET specific, easier API on top of traditional XML API**
 - No support for SAX (MSXML 4.0)
 - XML DOM (MSXML.DLL) can be used
 - **Remoting/RPC uses XML**
 - SOAP and XML Web Services

Web Service

- **Component call over HTTP**
- ***WebApplication = application used by a user***
- ***WebService = application used by another application***
- **Call to a function/method is packeted as an XML message that is sent using SOAP over HTTP or SMTP. Data returned packeted and sent the same way**
- **Uses SOAP (Simple Object Access Protocol)., which is language, OS or architecture neutral**

Web Service - Protocols



Universal Description Discovery and Integration (UDDI)

Simple Object Access Protocol (SOAP)

Web Service Description Language (WSDL)

eXtensible Markup Language (XML)

Tietojen välityskanava: Internet

Web Service 1

- **Web Service (.ASMX files in ASP .NET)**
 - Code for services methods
 - .NET wizard creates the project, programmer adds the code
 - Two files are created - codebehind

```
<%@ WebService Language="c#" Codebehind="Service1.asmx.cs"
    Class="WebService1.Service1" %>
```

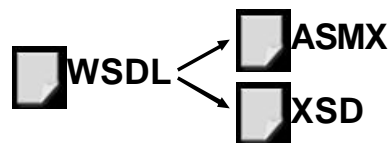
```
namespace WebService1 {
    public class Service1 : System.Web.Services.WebService {
        public Service1() {InitializeComponent();}
        private IContainer components = null;
        private void InitializeComponent(){}
        protected override void Dispose( bool disposing ) {
            if(disposing && components != null)
                {components.Dispose();}
            base.Dispose(disposing);
        }
        [WebMethod]
        public string GetId(string strKey, string strType) {
            return strKey.ToUpper() + strType.ToUpper();
        }
    }
}
```

 **ASMX**

 **CS**

Web Service 2

- **Web Service Description Language (WSDL)**
 - Description of the service
 - How to call the service
 - Methods, parameters and return values
 - XML
 - .NET environment creates automatically
 - <http://wml003600/WebService1/Service1.asmx?wsdl>

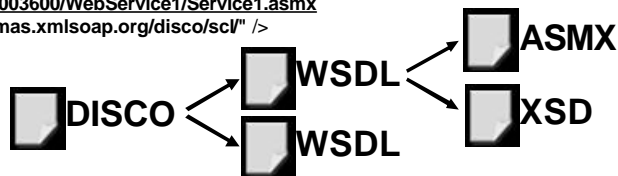


Web Service 3

- **Discovery Documents (DISCO)**
 - Publishes Web Services
 - Can be called directly (.vsdisco)
 - Describes the services in a server

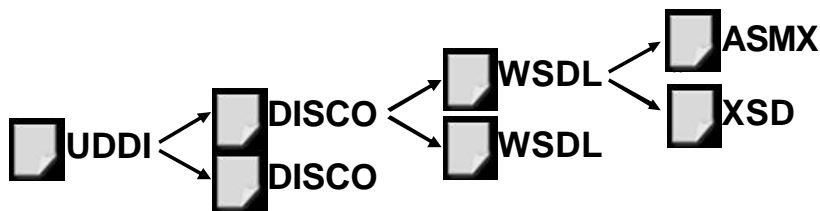
<http://wml003600/focus/WebService1/WebService1.vsdisco>

```
<?xml version="1.0" encoding="utf-8" ?>
<-discovery xmlns:xsd=http://www.w3.org/2001/XMLSchema
- xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
xmlns="http://schemas.xmlsoap.org/disco/" >
<contractRef ref=http://wml003600/WebService1/Service1.asmx?wsdl
docRef=http://wml003600/WebService1/Service1.asmx
xmlns="http://schemas.xmlsoap.org/disco/scl/" />
</discovery>
```



Web Service 3

- Universal Description, Discovery and Integration
- UDDI describes available services
- Yellow pages for Web Services
- Can be used externally (uddi.microsoft.com, uddi.ibm.com)
- Can also be used internally as a local directory for web services



Calling Web Services

- **Basic call: HTTP Get and HTTP Post**
 - Basic types (int, string, jne)
 - Basic type tables
 - Can be called in a “traditional” way
 - <http://wml003600/WebService1/Service1.asmx/GetId?strKey=s1&strType=as>
- **Default: Simple Object Access Protocol (SOAP)**
 - Structures
 - Enumerations
 - Classes
 - XML DataSets
 - Arrays
 - Can contain all kinds of structures

Web Service

- **Web Service is a functional component or program, that offers its functionality through the Web Service interface**
- **Web Services are used through the network (Internet/intranet)**
- **Data is transferred through XML**
- **Uses standard protocols, such as SOAP, HTTP, etc.**
- **Main goal is integration between systems**
 - **Without knowing the architecture behind a system**

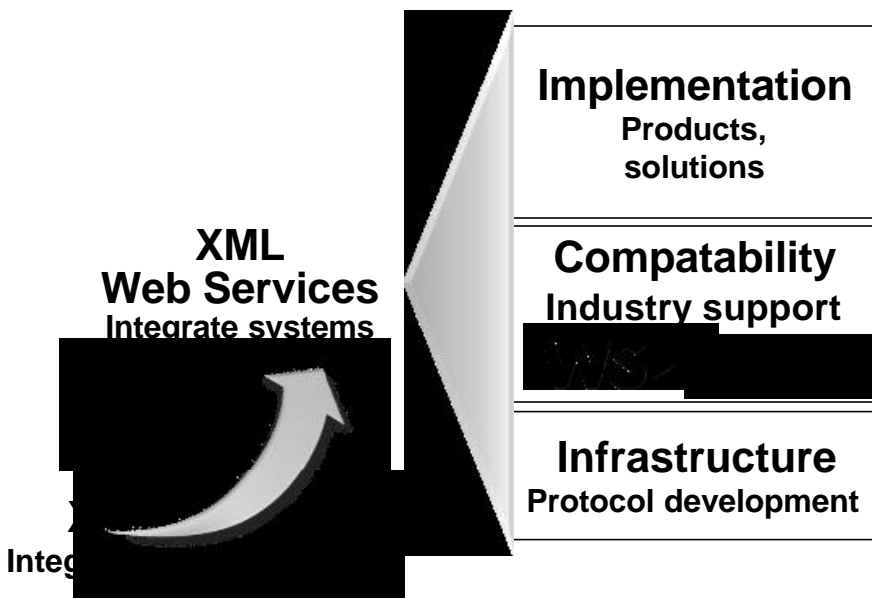
Where can Web Services be used

- **Integration scenarios**
 - **Service to a user – combining services (B2C)**
 - **Services between organisations (B2B)**
 - **Integration of internal systems (EAI, A2A)**
- **Write once – use from anywhere**

Cool – are we done?

- **Nope, Web services will evolve**
- **Lots of things coming**
 - **Security**
 - **Routing & Referral**
 - **Attachments**
 - **Transactions**
 - **Reliable messaging**

Web Services futures



Modula

SOAP
Mes

```
<?xml version="1.0" encoding="utf-8"?>
<S:Envelope xmlns:S="http://schemas.xmlsoap.org/soap/envelope/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema"
  xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
  <S:Header>
    <m:path xmlns:m="http://schemas.xmlsoap.org/rp">
      <m:action>http://tickers-r-us.org/getQuote</m:action>
      <m:to>soap://tickers-r-us.org/stocks</m:to>
      <m:from>mailto:johnsmith@isps-r-us.com</m:from>
      <m:id>uuid:84b9f5d0-33fb-4a81-b02b-5b760641c1d6</m:id>
    </m:path>
    <wssec:Security
      xmlns:wssec="http://schemas.xmlsoap.org/ws/2002/04/secext">
      <wssec:BinarySecurityToken
        ValueType="wssec:X509v3"
        EncodingType="wssec:Base64Binary">
        dWJzY3JpYmVybVlVbGc....eFw0wMTEwMTAwMD
      </wssec:BinarySecurityToken>
    </wssec:Security>
  </S:Header>
  <S:Body>
    <app:TrafficStatus
      xmlns:app="http://highwaymon.org/payloads">
      <road>520W</road><speed>3MPH</speed>
    </app:TrafficStatus>
  </S:Body>
</S:Envelope>
```

.NET and standards

- **C# ja “CLI”:** ECMA
 - Submitted 2000
 - Standard approved 2001
 - ISO standard about to be approved
 - Used in many projects, other platforms
- **XML, SOAP, WSDL:** W3C, IETF, OASIS
- **Additional development:** WS-I, standardization bodies
- **Partners in development:** HP, Intel, IBM, Ariba...

Existing code

- **Old Windows DNA applications**
 - Can be called from .NET
 - .NET components can be called from DNA
- **Third party applications**
 - Ready-made Interfaces
 - Database connections
 - XML:
 - Data transfer, for example BizTalk
 - Web Services

.NET - tools

- **Visual Studio .NET**
 - One programming environmentg
 - All applications
 - All languages
 - Extensible
 - Visual Studio is the basic tool
 - Additional features from partners, such as Rational, Compuware
 - New languages, testing, dev project management
- **MSDN Universal**

Source Code

- **CE.NET**
 - Download (<http://www.microsoft.com/embedded>)
 - Platform Builder for custom versions
 - OS Source code
- **Shared Source CLI beta**
 - CLI – CLR, basic class library, C# compiler
 - FreeBSD/Windows NT
 - Dowload (<http://msdn.microsoft.com>)
- **Windows NT/2000**
 - Source code for research use
 - Big customers can also obtain source code
 - Requests => Email (kimmob@microsoft.com)

.NET - Benefits

- **Many application types**
 - User Interfaces
 - Traditional applications
 - Web Services
- **Shared programming model**
 - All application types
- **Support for multiple languages**
 - Investments in training
- **Easier programming**
- **Protect old investments – integration to existing code**
- **Integration to other worlds and architectures**
- **Performance**
- **Security**
- **Newest technology!**

How to go forward?

- **Web**
 - <http://www.microsoft.com/net>
 - <http://msdn.microsoft.com>
- **Developer products**
 - Visual Studio .NET
 - Microsoft Developer Network – MSDN
- **Programs**
 - Developer programs – MSDN
 - Partner programs– Microsoft Certified Solution Provider program
- ***kimmob@microsoft.com***

Kysymyksiä ja vastauksia?



