Web Services & .NET Technologies

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- **Why Web Services?**
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- **Web Services basics and architecture.**
- **Development environments for Web Services.**
- **.NET and Web Services.**
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Why Web Services?

- **Human being that makes sense of a web page.**
- **Computers can’t understand what is going in a browser.**
- **Web services provide computer-to-computer interactions.**

Before Web Services

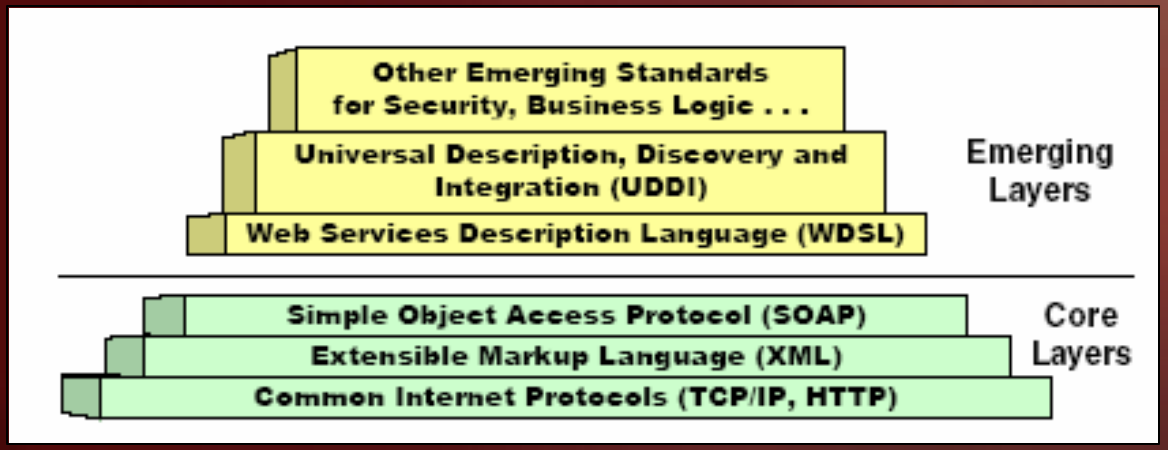
- **Service Oriented Architecture (SOA).**
- **Applications were designed as services that run on clusters.**
- **Tightly coupled, distributed computing protocols, such as DCOM, CORBA, or RMI, were used to enable clients to access these services.**
- **They limit the flexibility of the whole system and the reusability of individual services.**
- **Web Services represent the convergence between SOA and the web.**

Advantages of Web Services

- **Integration: Web services offer a big step towards application-to-application communication.**
- **Service Reuse: ability to reuse a service many times rather than creating a new service for the same function.**
- **Business Flexibility: Web services allow to build new solutions quickly, at a reasonable cost, and with the reusability feature more flexibility is achieved.**

Web Services basics and architecture

- Communicate over open protocols such as HTTP
- Using structured forms of XML
- SOAP (Simple Object Access Protocol)
- WSDL (Web Services Description Language)
- UDDI (Universal Description, Discovery and Integration)



Development environments for web services

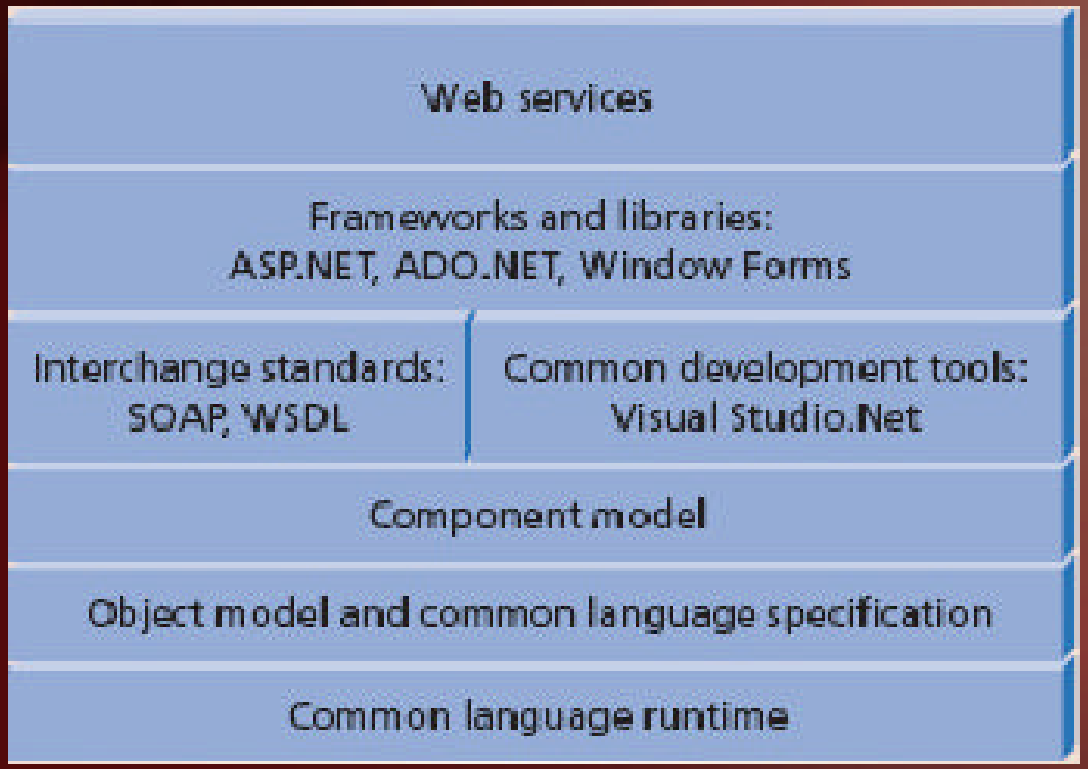
- **Standards enable the opportunity for web services deployment.**
- **Success of web services depend on the ability of programming environments to provide developers with tools.**
- **Microsoft, IBM, and other companies developed the SOAP XML-based format and WSDL.**
- **IBM WebSphere SDK, SunOpen Net Environment (Sun ONE), Mono project, Microsoft .NET**

Microsoft .NET and Web Services

- **".Net is a series of Microsoft technologies interconnecting the world of information, people and devices“, Microsoft’s definition.**
- **.NET is a collection of resources that includes development tools and languages, server software, and protocols.**
- **The foundation of .NET platform is the incorporation of the eXtensible Markup Language (XML) and the Simple Object Access Protocol (SOAP).**
- **The infrastructure that ties .NET technologies together is the .NET Framework that allows applications to access system services.**

Microsoft .NET and Web Services

- **.NET architecture is mainly composed of six layers**

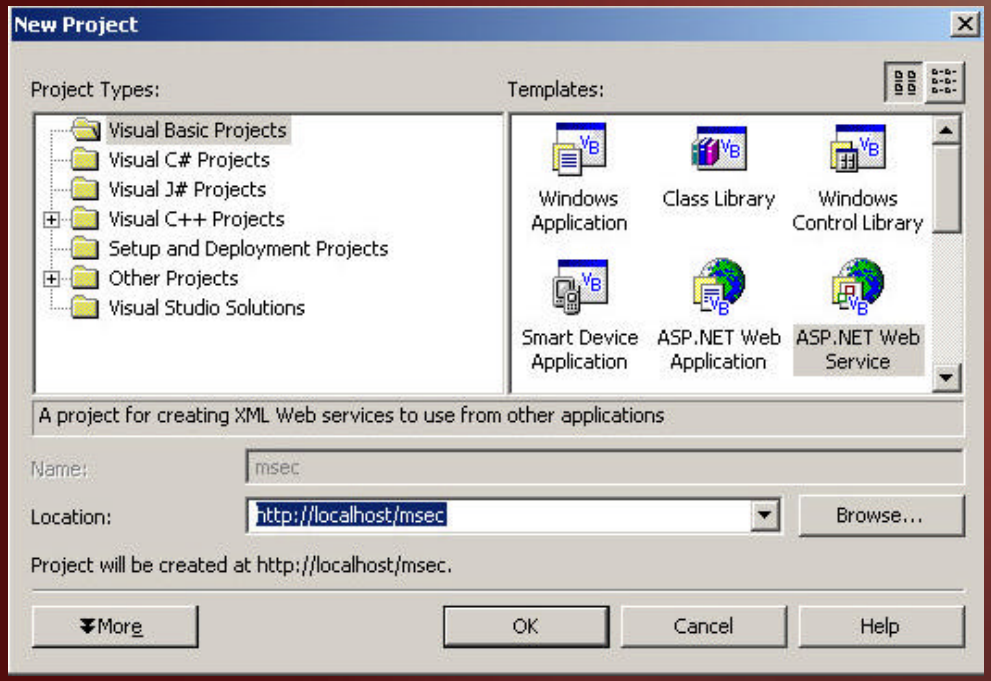


Microsoft .NET and Web Services

- **.NET removes the distinction between traditional software application development and web development.**
- **.NET offers mechanisms that make a Web page useful as both a human interface and an application program interface.**
- **.NET provides development support for source code in three major programming languages, Visual C++, Visual C#, and Visual Basic .NET.**
- **A main example of the usage of Web Services in .NET technology is the Microsoft "Passport" technology which is built-in windows XP.**

Microsoft .NET and Web Services

- **.NET provides Web Services developers with a variety of tools to create Web Services.**
- **The developer begins by selecting the project type ASP Web Service, executable, etc and the programming language to be used.**

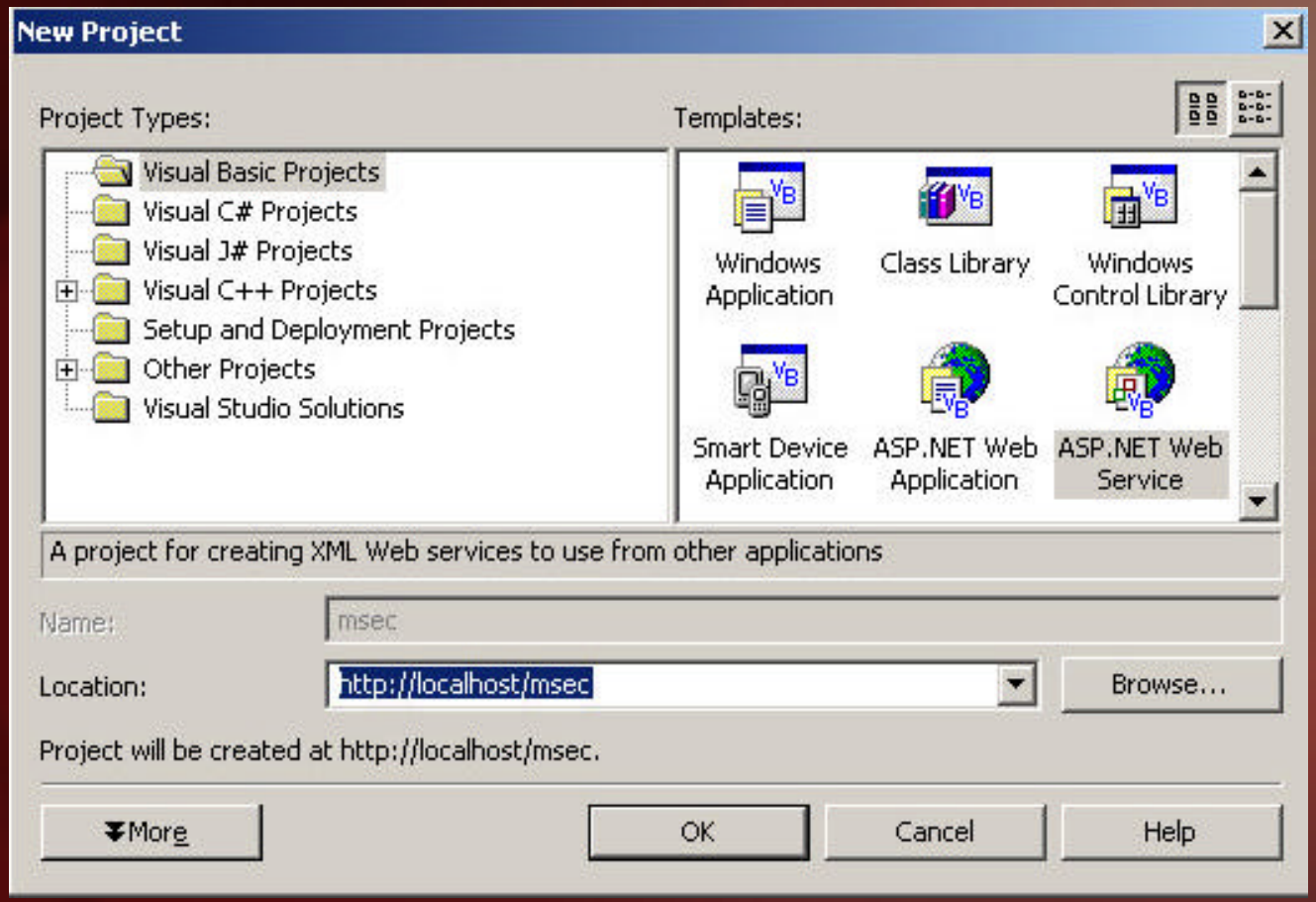


Microsoft .NET and Web Services

- **The developer also names the service and specifies the location of the web server that will run the Web Service.**
- **The developer then creates the application using the many graphical resources and wizards provided with the development environment.**
- **The build process not only performs compilation but also creates the auxiliary files needed to successfully implement a Web Service, SOAP file, WSDL file, etc.**
- **.NET even provides a Web Services registration facility that allows developers to search for or publish Web Services through the globally available yellow pages of Web Services UDDI.**

Creating Web Services in .NET

- **We begin with creating a new project.**



Creating Web Services in .NET

- **Visual Studio .NET will automatically create all the necessary files along with a default web service .asmx file which contains at the top of it the reference to the file containing the XML web service and the language for the service.**

```
Imports System.Web.Services
<System.Web.Services.WebService(Namespace:="http://tempuri.org/MSEC/Service1")> Public Class MSEC
Inherits System.Web.Services.WebService
```

Creating Web Services in .NET

- **The default Web Service page includes the following commented code:**

```
' WEB SERVICE EXAMPLE
    ' The HelloWorld() example service returns the string Hello World.
    ' To build, uncomment the following lines then save and build the project.
    ' To test this web service, ensure that the .asmx file is the start page
    ' and press F5.
    '
    '<WebMethod()> _
    'Public Function HelloWorld() As String
    '    Return "Hello World"
    'End Function
```

- **Using the example given in the default code we can create a function that to be exposed as a Web Service.**

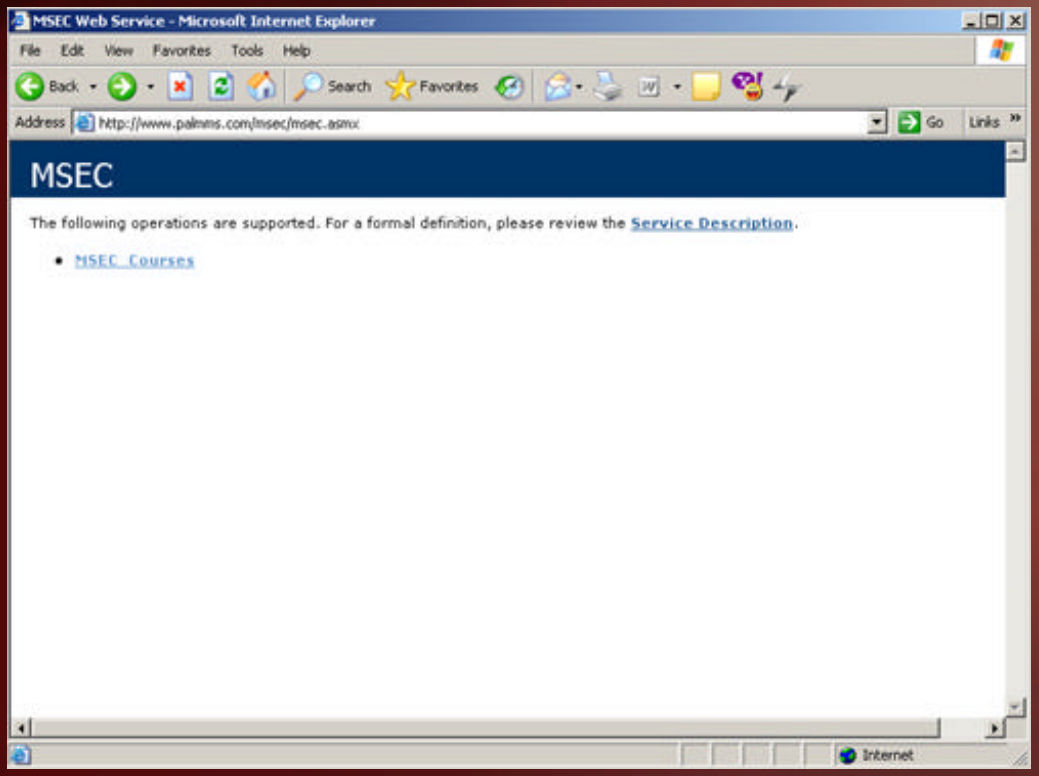
Creating Web Services in .NET

- **Example**

```
<WebMethod()> Public Function MSEC_Courses(ByVal srtType As String) As String
        Dim courses As String
        If srtType = "Core" Then
            courses = "EC 511 E-commerce Basic IT "
        End If
        If srtType = "IT" Then
            courses = "CS650 Database Engineering or INFS 614 Database "
        End If
        If srtType = "Bus" Then
            courses = "MBA 623 Marketing Management,Four Elective Courses"
        End If
        If srtType = "Pub" Then
            courses = "Five Elective Courses"
        End If
        If srtType = "Health" Then
            courses = "HSCI 707 Health Care Management "
        End If
        Return courses
    End Function
End Class
```

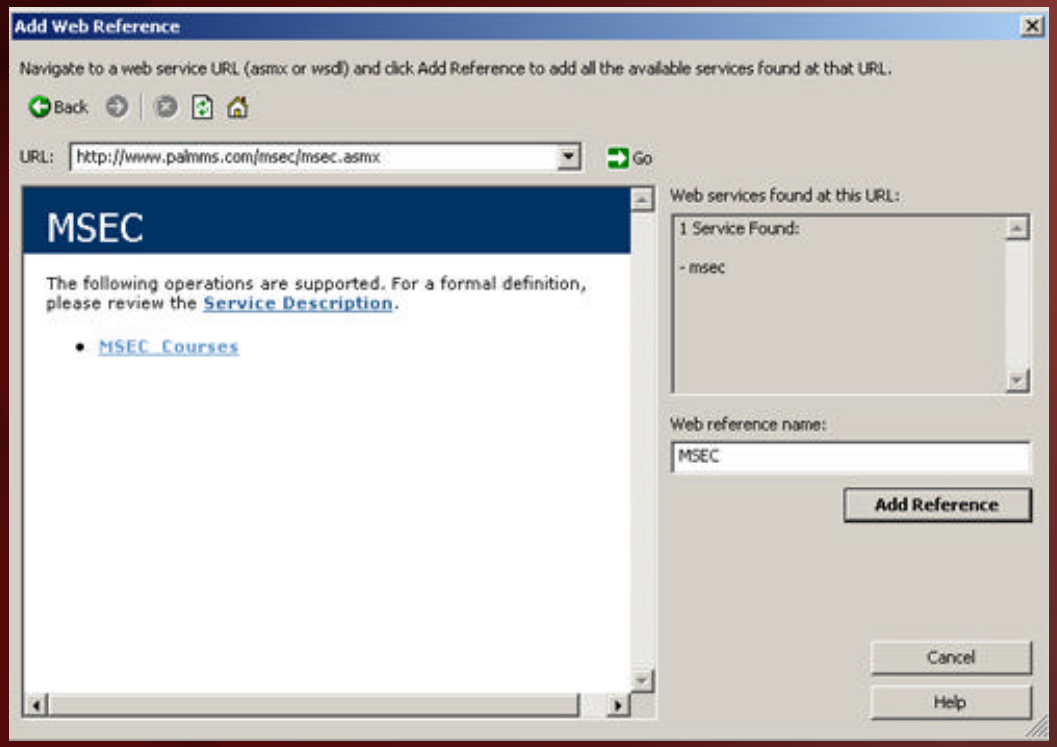
Creating Web Services in .NET

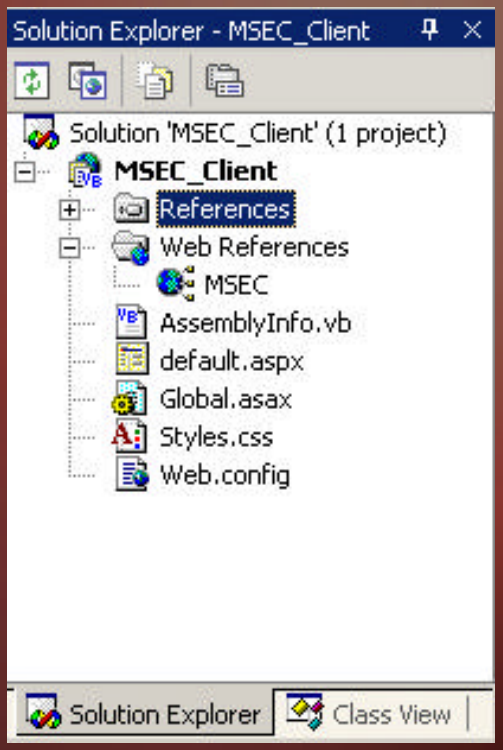
- **When the project is built the Web service discovery file, WSDL document is created.**
- **http://palmms.com/MSEC**



Creating Web Services in .NET

- **A client application can be build easily to consume the Web Service.**
- **The first step is to add a reference to the Web Service that we created and published before.**





Creating Web Services in .NET

- **This reference to the Web Service allows treating it like any other object within the project.**
- **In the file .aspx.vb which contains the code behind page the following should be declared:**

```
Dim MSECServiec As MSEC.MSEC = New MSEC.MSEC
```

- **This line creates an object MSECServices of MSEC.MSEC type.**
- **When the client application is built the compiler creates a proxy class using the WSDL document.**

Creating Web Services in .NET

- **The client web application can be accessed using http://palmms.com/MSEC_client.**
- **When using SOAP for the request and response messages, the proxy creates a SOAP envelope that is passed to the Web Service.**
- **After the invoked method at the Web Service executes the return value is passed back to the proxy in a SOAP envelope over HTTP .**
- **The client application converts the SOAP XML response to the format required by the client web application.**

.Net vs. other technologies (J2EE)

- **Development and deployment of Web Services doesn't require any specific underlying technology platform.**
- **The Web Services platform debate is often viewed as a Sun J2EE vs. Microsoft .NET.**
- **Web services do not rely o either J2EE or .NET, they depend mainly on SOAP, XML, and other components.**
- **.NET is runs on a single platform (windows) but it supports multiple languages.**
- **J2EE is a platform independent environment and uses a single language (Java).**

.Net vs. other technologies (J2EE)

	.NET	J2EE
Programming Language	C#	Java
Interpreted Language	MSIL	Java Bytecode
Runtime Environment	CLR	JVM/JRE
Rich-Client	VB.NET	Swing
Web Presentation	ASP.NET	JSP/Servlets
Business Services	????	EJBs
DB Integration	ADO.NET	EJB-SQL/JDBC
Messaging Integration	MSMQ	Msg EJBs/JMS
Legacy Integration	COM TI	JCA

- **.NET will probably become the standard for client-side application development because Microsoft is so dominant there.**
- **On the other hand J2EE is already the main tool in building and deploying enterprise and large-scale Web applications.**
- **The deployment platform is also likely to be an important factor.**

Conclusion

- **Web Services provide computer-to-computer interaction.**
- **Web Services provide standards but need development environments.**
- **Microsoft .NET environment is built and structured to be mostly integrated and related to Web Services concepts.**
- **.NET is mostly the standard for client side.**