

Executive Summary

Over the years, IT environments have become more complex and more heterogeneous due to diverse customer needs and rapid innovation in the IT industry. Integrating Microsoft® .NET software and Java applications has become critical for businesses that have made significant investments in both technologies.

To address this issue, Microsoft delivers interoperability by design.

Microsoft's approach to interoperability helps customers achieve interoperability between .NET and Java applications without having to "rip and replace" code or make costly application rewrites.

What is .NET/Java Integration?

It's all about getting .NET and Java to work better together. .NET/Java integration is:

- **Bringing people together** through easy-to-use software, rich features, proven interoperability, and broad support for industry and technical standards.
- **Ensuring interoperability between .NET and Java Web services-based architectures** through technical exchanges, industry collaboration, standards engagements, and interoperability "plugfests."
- **Improving business efficiencies** with products such as Microsoft Office, BizTalk® Server, Identity Integration Server, Visual Studio®, and Windows Vista™.
- **Giving developers the resources they need** to build innovative IT solutions that bring out the best in .NET and Java technologies using support for message formats and protocols, Web services, and tools and documentation for developers.

Microsoft supports .NET/Java Integration

For customers who want to get the most from .NET and Java, Microsoft delivers interoperability by design four ways:

- **Products:** Engineering Microsoft products to be broadly interoperable with Java/Java EE applications through APIs, SDKs, DDKs, and native support for XML.
- **Community:** Working together with customers, partners, and competitors to enable a broad range of integration scenarios that benefit shared interoperability needs and promote competition in the marketplace.
- **Access:** Licensing technologies to and from other companies and offering key technologies, including Office Open XML file formats and 38 Web services standards, under the Open Specification Promise.
- **Standards:** Supporting industry and technical standards for data formats, messaging protocols, and Web services standards and actively participating with leading standards-setting organizations to promote technology adoption.

Microsoft Supports Standards

- **Microsoft products support dozens of industry and technical standards that enable interoperability** including HTTP, Kerberos protocol, Open XML, SOAP, UDP, WSDL, WS-Interoperability (WS-I) Basic Profile, WS-*, and XML.
- **Microsoft is actively engaged with more than 100 national and international standards-setting organizations** including ECMA, ETSI, IEEE, IETF, ISO/IEC JTC1, ITU, OASIS, OMA, and W3C.
- **Microsoft engineers have authored or co-authored dozens of technical standards** including .NET CLI, C# CLI, Open XML, POSIX threads, XML, and more than 40 Web services standards such as SOAP, WSDL, WS-Addressing, WS-Policy, WS-Security, and WS-Trust.
- **Microsoft is working with industry to define a new generation of software and Web services** based on eXtensible Markup Language (XML).

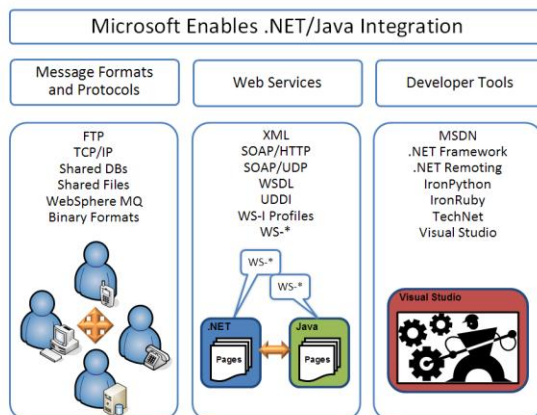
.NET/Java Integration is Real Today

Microsoft is working to make .NET/Java integration easier and seamless.

- **Resources for developers:** Microsoft provides technical guidance and best practices for .NET/Java integration on Web sites such as MSDN®, Microsoft TechNet, and CodePlex.
- **Native support for XML:** Microsoft products and technologies simplify .NET/Java integration by sharing data and functionality over networks through standard, platform-independent protocols such as XML, SOAP, HTTP, and Web services.
- **Integrated development environment:** The Visual Studio development system provides a comprehensive tools platform, reduced development complexity, improved team communication, and extensive third-party support for creating interoperable software solutions.
- **Project Tango:** Microsoft engineers are working with Sun Microsystems to ensure interoperability between .NET and Java Web services-based architectures.
- **Microsoft Partner Program:** Microsoft supports a rich partner ecosystem with a wide range of enterprise solution offerings that enable proven .NET/Java interoperability for Java EE applications running on IBM WebSphere, BEA WebLogic, JBoss, Novell, and Sun.

For More Information, Visit:

- .NET and Java Interoperability <http://msdn.microsoft.com/vstudio/java/interop>
- Microsoft J+N Initiative <http://www.microsoft.com/windowserversystem/jplus/default.aspx>
- Microsoft Case Studies <http://www.microsoft.com/casestudies/>
- WS-*/JAX-WS Interoperability <http://java.sun.com/developer/technicalArticles/glassfish/ProjectTango/>
- Find more www.microsoft.com/interop



Microsoft®

Customer Use Cases	Microsoft Solutions	Standards Supported in Microsoft Products	For More Information, Visit
Integrate .NET with Java Messaging Service (JMS)	Microsoft BizTalk Server 2004 includes a Custom Adapter Framework that can be used to create custom JMS/Java EE adapters. JNBridge provides a third-party solution, JNBridge Pro, which greatly reduces the complexity and risk associated with building a custom adapter.	HTTP, IP, SOAP, TCP, UDP, WS-*, XML, XSD,	1) http://www.inbridge.com/biztalk/JNBridgePro-BizTalk-JMS-Adapter.pdf
Exchange binary data between .NET and Java environments	The Microsoft .NET Framework enables binary interoperability with Java EE applications through bridging technologies and Web services implementations. Third-party vendors such as Intrinsic offer a range of interoperability solutions for COM, Java, .NET, AS/400, CORBA, and Microsoft Exchange Server.	COM, HTTP, IP, SOAP, TCP, WS-*, XML, XSD	1) http://download.microsoft.com/download/6/f/b/6fb75d65-f2eb-43c2-a3cc-743eb4c75206/whitepaper_interop.pdf
Integrate .NET with AXIS servers	The Microsoft .NET Framework is interoperable with Web services running on Tomcat and AXIS v1.2.1 and supports functions including how to pass primitives, custom data structures, and arrays.	HTTP, IP, SOAP, TCP, WS-*, XML, XSD	1) http://msdn2.microsoft.com/en-us/library/aa478995.aspx
Create Microsoft Office documents with Java	The 2007 Microsoft Office system supports the Office Open XML file format as the default file format for word-processing, spreadsheet, and presentation documents. Office Open XML documents can also be created using Java code and external data sources, such as line-of-business applications or database servers, without using any Microsoft tools or APIs. The generated document can contain graphics, tables, formatted text, and custom XML schemas.	CSS, Open XML, XSD, XSL	1) http://openxmldeveloper.org/archive/category/1008.aspx 2) http://dinoch.dyndns.org:7070/WordML/AboutWordML.jsp
Call Java from Microsoft Office Excel® Services	Excel Services in Microsoft Office SharePoint Server 2007 supports the creation of user-defined functions (UDFs) that can be used to call a Web service running under Java EE, WebSphere, WebLogic, Oracle, or any other application.	HTTP, SOAP, WS-*, XML, XSD,	1) http://msdn2.microsoft.com/en-us/library/ms493934.aspx
Enable identity authentication with Java identity providers	Windows® CardSpace (formerly InfoCard) supports identity authentication and federation scenarios with open source Java identity providers, such as Ping Identity, through the use of embedded security tokens in SOAP messages (as defined in the OASIS WS-Security 1.0 specification) and the collection and validation of security tokens with a security token service (as defined in the WS-Trust specification).	Kerberos protocol, X.509, SAML Token Profile 1.1, HTTP, XML, SOAP, WS-Addressing, WS-Trust WS-MetadataExchange, WS-Security, WS-SecurityPolicy,	1) http://download.microsoft.com/download/6/c/3/6c3c2ba2-e5f0-4fe3-be7f-c5dcb86af6de/infocard-guide-beta2-published.pdf 2) http://www.identityblog.com/?p=585
Develop applications for Java and .NET environments	The Microsoft Visual Studio Developer Center provides resources such as <i>Application Interoperability: Microsoft .NET and J2EE</i> , which presents interoperability best practices and illustrates these approaches with a functional sample application. The guide shows how to link Microsoft .NET and Java EE, using Web services, runtime bridges, and asynchronous techniques.	HTTP, IP, SOAP, SSL, TCP, WS-*, XML	1) http://msdn.microsoft.com/vstudio/java/interop/default.aspx?pull=/library/en-us/dnpg/html/jdni.asp
Exchange encrypted data using SSL	The Microsoft .NET Framework and Java both support the AES encryption standard and can exchange encrypted data over TCP/IP connections; in addition, SSL-enabled streams exist for both Java and .NET.	AES, HTTP, IP, SSL, TCP	1) http://www.microsoft.com/windowsserver2003/techinfo/overview/appservfaq.mspx
Use shared data sources to exchange data between .NET and Java applications	Microsoft SQL Server™ 2005 JDBC Driver provides access to SQL Server 2000 and SQL Server 2005 from any Java application, application server, or Java-enabled applet. This is a Type 4 JDBC driver that provides database connectivity through the standard JDBC APIs available in Java EE. The driver is JDBC 3.0 compliant and runs on JDK 1.4 and higher. It has been tested against all major application servers including BEA WebLogic, IBM WebSphere, JBoss, and Sun.	JDBC 3.0, JTA, SQL, T-SQL, TDS 7.2, XA protocol	1) http://msdn.microsoft.com/data/jdbc/default.aspx
Use SAP to connect Java and .NET	The SAP Connector for .NET and the Integrated Portal Development Kit for .NET enable interoperability between Microsoft .NET applications and SAP systems. The tools support SAP remote function calls and Web services and allow developers to write various applications including Web forms, Windows Forms, and console applications using Visual Studio.	HTTP, SOAP, WS-*, XML, XSD	1) http://www.microsoft-sap.com/overview_sap_connector.html 2) http://www.microsoft.com/presspass/press/2005/jan05/01-12MicrosoftSAPCommitPR.mspx
Access Microsoft Message Queuing from Java running on Windows, in any Java Virtual Machine (JVM)	Microsoft Message Queuing (formerly MSMQ) is a technology that enables applications running on different machines to communicate even when they may temporarily be offline. Although native Java clients cannot directly access Message Queuing, they can asynchronously interoperate with Message Queuing using a Java-to-COM bridge, using a JMS Provider for Message Queuing, or through a Web service interface.	COM, HTTP, IP, SOAP, TCP, WS-*, XML, XSD	1) http://support.microsoft.com/kb/176816/ 2) http://msdn.microsoft.com/library/default.asp?url=/library/en-us/dnpg/html/jdni_ch05.asp
Port Java applications to Windows environments	Java Language Conversion Assistant 3.0 (JLCA) is a tool for developers that automatically converts existing Java-language code into Microsoft Visual C#® code for .NET environments.	.NET CLI, C# CLI	1) http://msdn.microsoft.com/vstudio/downloads/tools/jlca/default.aspx
Compile Java code for .NET CLR systems	The Microsoft Visual J#® development tool compiler can compile programs written in Java syntax to .NET pseudocode (Microsoft intermediate language [MSIL] code), which can be run on the common language runtime.	.NET CLI	1) http://msdn.microsoft.com/vsharp/
Send and receive encrypted messages between Java and .NET using Web services	The Microsoft .NET Framework can send and receive encrypted messages with J2SE using Web Service Enhancements 2.0 for .NET and Sun Java WSDP 1.5, both of which support the OASIS WSS 1.0 standard. X.509 certificates are used to sign and encrypt SOAP requests and responses between the two environments.	HTTP, SOAP, WS-*, WS-Security, X.509, XML, XSD	1) http://msdn.microsoft.com/webservices/webservices/building/interop/default.aspx?pull=/library/en-us/dnbda/html/wssinteropjwdsdp15.asp