

# Interfacing Java and .Net

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## About the Speaker

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**Technical:** Web Applications, Web Services  
Enterprise Software  
Database Design  
Data Migration  
C#, ASP.Net, ADO.Net, C++, COM, ATL, XML  
Java, Spring Framework, Hibernate, JMS

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# Interfacing Java and .Net

## What You'll Learn

- Reasoning behind each platform
- Pros and cons of each platform
- Problems in interoperability
- Solutions to interfacing Java and .Net

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## Java History

- **Developed by Sun Microsystems starting in late 1990**
- **Originally intended for smart devices (PDA, set top box)**
- **Reaction to C++**
  - **C++ had too large a foot print for embedded software**
  - **Lack of garbage collection leads to errors**
  - **Needed portable facilities for security, distributed programming and threading**
  - **Wanted a platform that was easy to port to all types of devices**
- **James Gosling came up with a new object-oriented language called Java**
- **Java and Java Platform first released in 1995 and grew in popularity with rise of Internet**

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## Java Today

- **Java is intended to run on any operating system**
  - Little concern for container environment
  - JDBC, JMS and JNI take care of interface to container
- **Market Penetration**
  - High penetration into back-end enterprise systems
  - Large penetration into web applications
  - Little penetration into desktop applications

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## .Net History

- **Developed by Microsoft starting in late 1990's**
- **Wanted to provide unified solutions to common programming problems**
  - **User interface**
  - **Security**
  - **Memory management**
  - **Exception handling**
  - **Data access**
  - **Common type system (VB, C#, C++)**
- **Move away from problems in COM**

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## .Net Summary

- .Net optimizes for Windows operating system
- Fundamental concern for container environment
  - Active Directory
  - COM
  - Windows System32
- Lesser penetration into backend, enterprise systems
- Large penetration into web applications
- Large penetration into desktop applications
  - Windows is preeminent desktop operation system
  - Office is preeminent office desktop application
  - .Net offers seamless interface to both technologies

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# Interfacing Java and .Net

## How Java and .Net Compete

- **.Net offers a unified vision of software development**
- **Java offers a wide array of third-party choices for development environment**
- **.Net is clear winner as a desktop application dev't env**
- **Java and Microsoft/.Net compete head-to-head pretty well as**
  - **Web Application Servers**
  - **Mobile Device applications**
- **Java has much higher penetration into back-end systems**

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## Comparison of Java and .Net Technologies

- **JSP/Servlets – Aspx**
- **JDBC – ADO.Net**
- **JMS – MSMQ/WCF**
- **EJB – COM+**
- **RMI – .Net Remoting/WCF**
- **JAX-WS/Axis – Asmx/WCF**
- **XMLBeans/JAXB – XmlSerializer/XSD.exe**

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## Interoperability Problem Statement

- **Straightforward low-level issues**
  - Byte order
  - Data format
  - Hardware compatibility
- **These are easy to solve**
  - Allowed broad acceptance of Internet
- **Complex integration issues**
  - Rich complexity of systems trying to communicate
  - A TCP/IP socket connection between Java and .Net systems does not necessarily mean that they are talking to one another

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## Example Interoperability Problems

- **Interop Examples**
  - Make our .NET inventory management system talk to our J2EE customer relationship system
  - Our sales staff wants to access our CRM system (written in J2EE) from Outlook
  - Our company just purchased technology built with the “other” platform and now we are forced to integrate it with our system
- **Often the first proposed solution is “web services with WS-\*”, but that is not necessarily the best solution**

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## Solution Set for Interoperability

- **Shared Resource**
  - File
  - Database
  - Queue
- **In-process**
- **Out-of-process**
  - Sockets with proprietary protocol
  - RPC-based (Remoting/WCF, RMI)
  - REST or XML/HTTP
  - Web Services
  - Hybrid solutions

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## XML Format

- **Always start with schema (XSD)**
  - Start from center of design and work your way out
  - Allows for clear contract between the systems
  - Eases implementation due to development tools
- **.Net has serialization in language (XmlSerializer) and XSD.exe**
- **Java can use XMLBeans, JAXB or other tool**
- **Demo**

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## Shared Resource: Database

- **May already be running, reliable and secure in the enterprise**
- **JDBC and ADO.Net provide easy interoperable access**
- **Data is out-of-the-box comprehensible due to SQL and JDBC/ADO.Net**
- **Expensive in operation since round-trips to database are costly**
- **Different solutions**
  - **Polling**
  - **Triggers**
  - **XML (some modern database implementations)**

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## Shared Resource: MQ

- Especially good solution if already running in your enterprise
- Reliable and secure in the enterprise
- Expensive if not already deployed

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## In-Process Interop

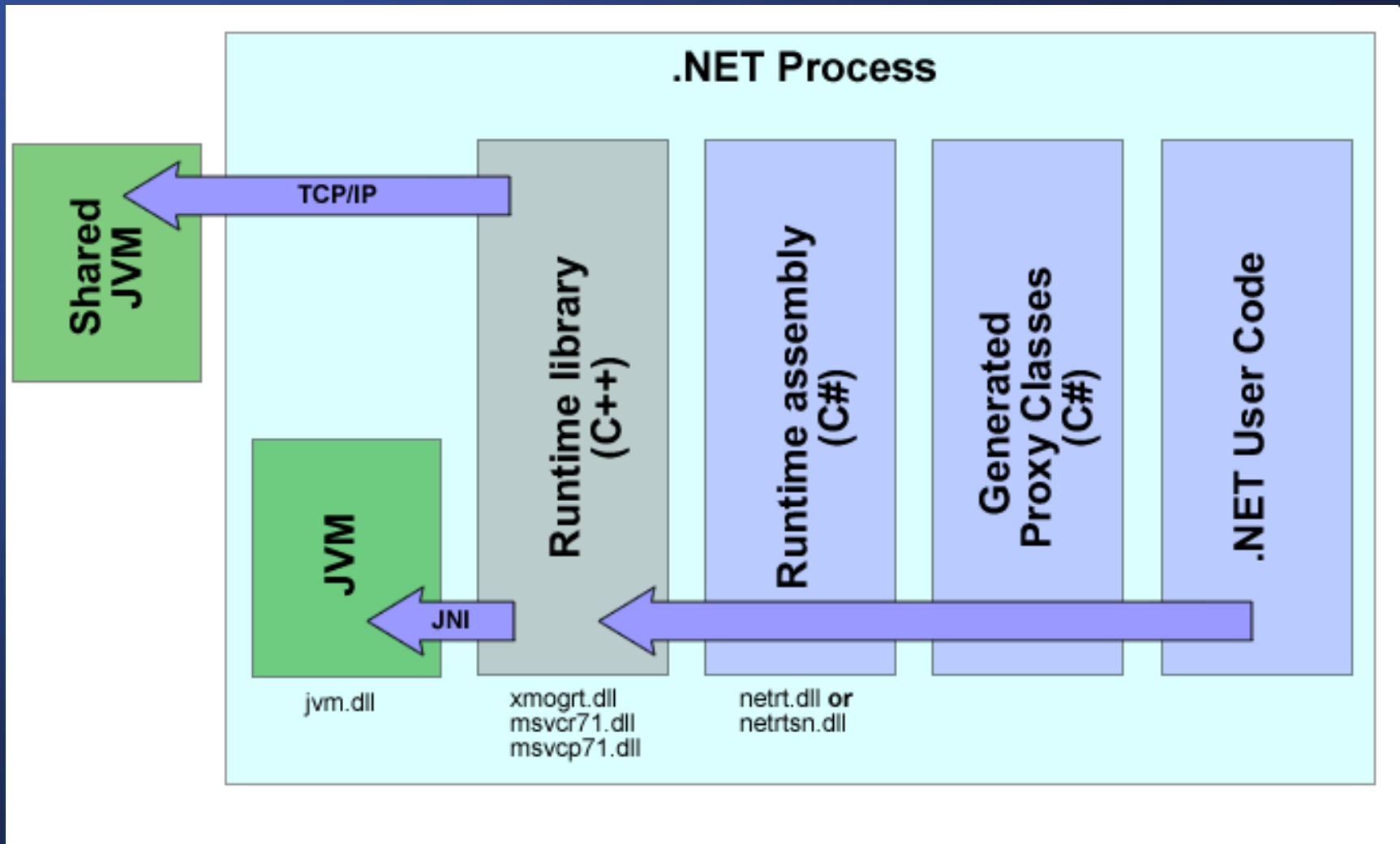
- **Choices:**
  - Cross compile (Java byte code -> IL or vice versa)
  - A single process hosts both the JVM and the CLR simultaneously
- **Different methods**
  - Register Java class as COM object using the ActiveX Bridge in the JDK and use COM Interop
  - Use JNI with unmanaged and managed C++ as bridge
  - IKVM ([www.ikvm.net](http://www.ikvm.net)): Open Source
  - Grasshopper ([www.mainsoft.com](http://www.mainsoft.com)): Free/Commercial
  - JuggerNET ([www.codemesh.com](http://www.codemesh.com)): Commercial
- **Demo**

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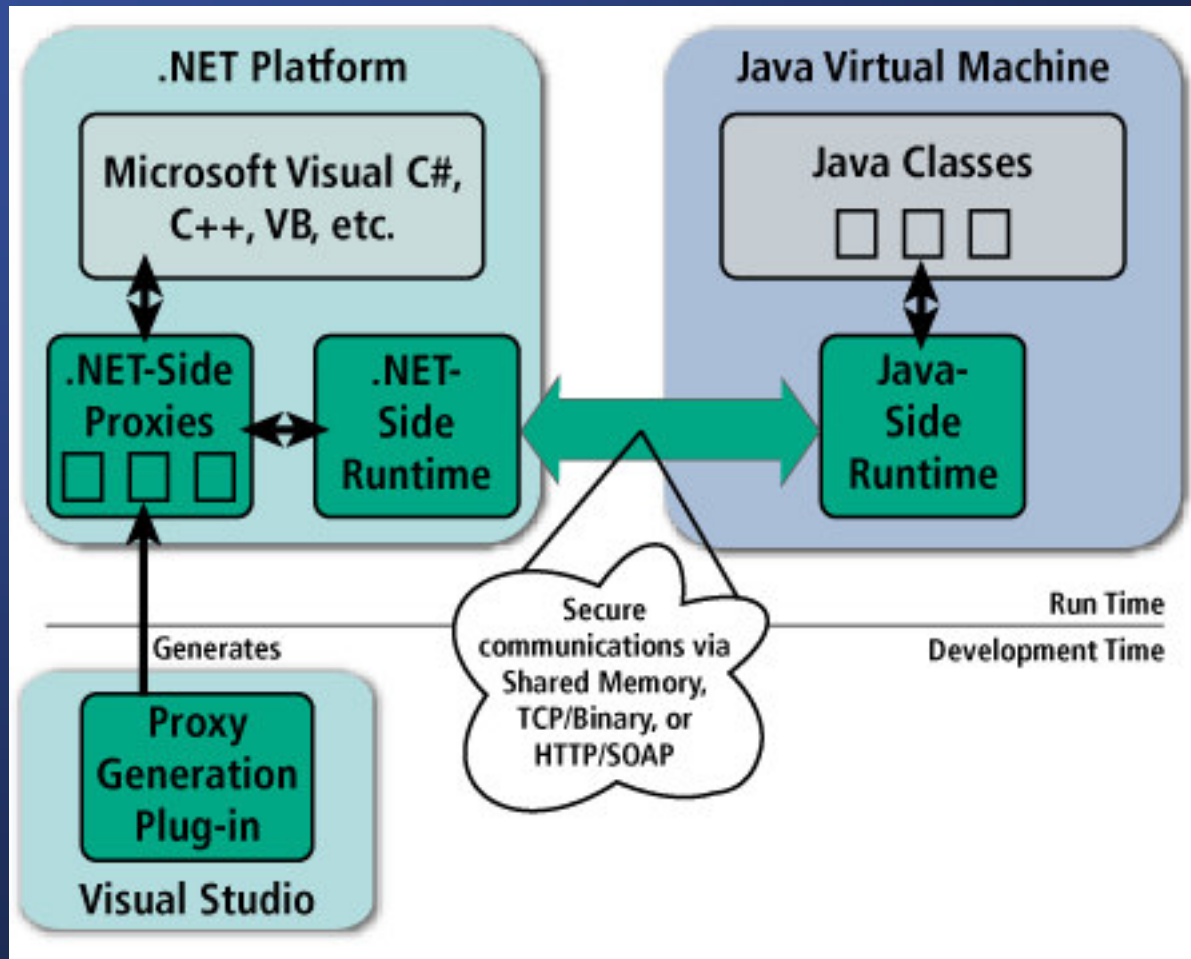
## Out-of-Process Interop

- **Sockets**
- **RPC**
  - Visibroker (Borland): Commercial
  - JNBridge ([www.jnbridge.com](http://www.jnbridge.com)): Commercial
  - Intrinsic J-Integra ([www.intrinsic.com](http://www.intrinsic.com)): Commercial
  - Ice ([www.zeroc.com](http://www.zeroc.com)): Open Source
  - Java/.Net only (no Ruby, Perl, C++, etc)
- **Rest or XML/HTTP**
- **Web Service**
- **Consider performance constraints early**

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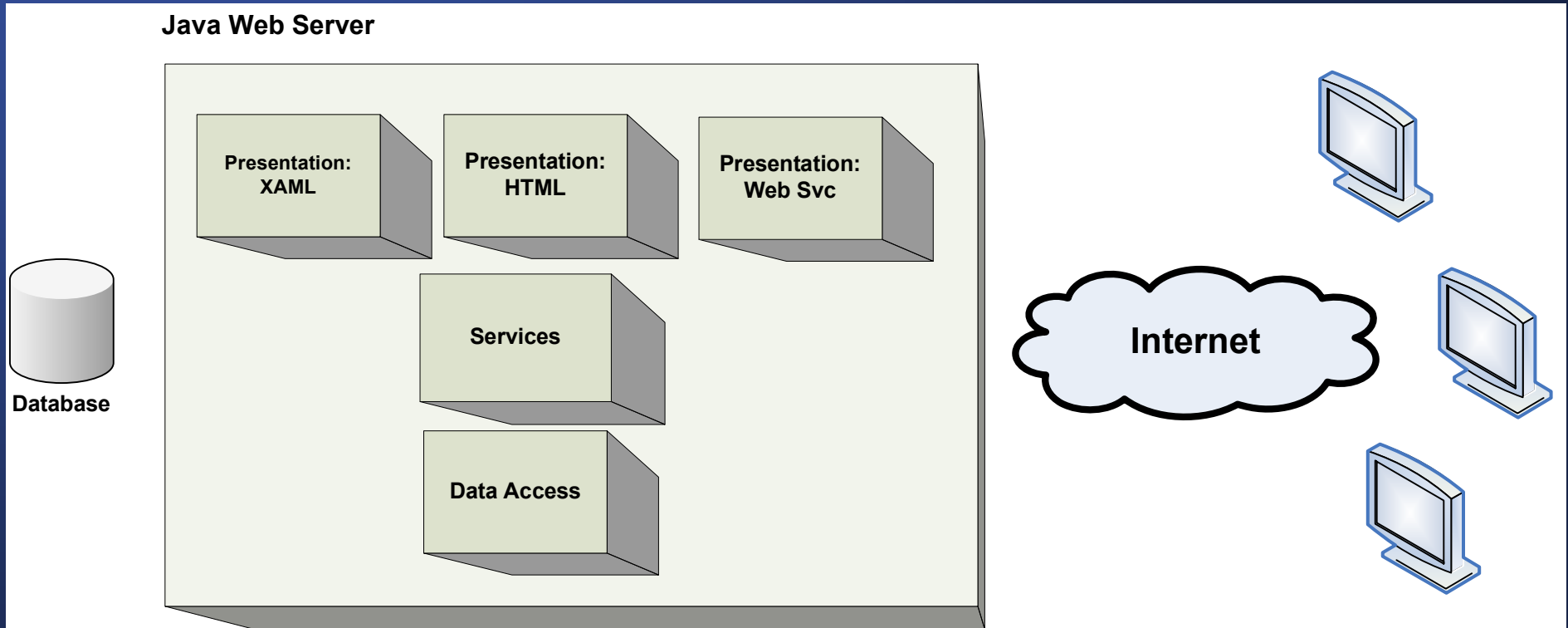
## Hybrid Solutions

- **Office to Java**
  - Office is the pre-eminent rich client solution
  - Employ Java service to load data into Office app
  - External automation
  - In Proc automation (COM, .Net)
  - Smart Tags (custom actions)
  - Excel: real-time data import
  - XML based interaction
- **WPF to WCF to Java web service**
- **Java-generated XAML**
- **Demo**

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## Conclusion

- **Solution must be practical**
- **Don't go with a solution just because of the buzz**
- **What tools do we have available to make our systems work together?**
- **Not “what new tools are out there that I can buy?” but rather “what is running in the shop today?”**
- **What do we have skills with today?**
- **What are we comfortable running today operationally?**
- **What can we afford to use, given our existing resources, financial and otherwise?”**
- **Hybrid approaches are possible**

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