An Introduction to .NET for the J2EE Programmer

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Overview

- .NET Framework overview and terminology
- A Quick Look at C#
- A detailed look at the important topics
  - Class Libraries
  - Component Model
  - Application Servers
  - Code Packaging / Deployment
  - Versioning
  - Security Model
  - Integration with Legacy Code
  - Portability
.NET Framework Overview and Terminology

Source: Microsoft Corp.
.NET Framework Overview and Terminology 2

- .NET Framework
- TLAs
  - CLI
  - CLR
  - CLS
  - CTS
  - VES
  - CIL
Common Language Infrastructure

- ECMA/ISO standard
- CLR is the name for Microsoft’s implementation
- Defines the Common Type System (CTS), the Virtual Execution System (VES) and the Common Language Specification (CLS)
Common Language Runtime

- Microsoft ships several languages
  - C#
  - VB.NET
  - C++ (with managed extensions)
  - JScript.NET
  - J#
  - ILasm

- Third party languages
  - Eiffel by Eiffel Software
  - COBOL by Fujitsu
  - FORTRAN by Lahey/Fujitsu
  - Delphi by Borland
  - Perl by ActiveState
  - Many research/toy languages

http://www.jasonbock.net/dotnetlanguages.html
Common Language Specification

- **CLS Framework**
  - A library consisting of CLS-compliant code

- **CLS Consumer**
  - A language or tool that is designed to allow access to all of the features supplied by CLS-compliant frameworks, but not necessarily be able to produce them

- **CLS Extender**
  - A language or tool that is designed to allow programmers to both use and extend CLS-compliant frameworks
Virtual Execution System

- An abstract runtime model (the equivalent of the Java Virtual Machine).
- Common Intermediate Language (CIL)
  - Not designed to be interpreted.
  - Has direct support for manipulating unmanaged data.
  - Has direct support for calling unmanaged code.
- Provides Application Domains and Contexts and remoting support across both of these boundaries.
Java Byte Code

All Java Byte Code

Verifiably Type Safe Java Byte Code
Managed Data

- Like Java, most code uses Managed Data. That is data that is managed by the runtime either on the stack or via the garbage collector.

- Unlike Java, trusted code can use unmanaged data (*i.e.* data outside of the control of the runtime), this can be used for interoperating with existing unmanaged code or for efficiency.
C#

- Not just a copy of Java
- Syntax very much like C++ and Java
- Fixes some Java flaws (e.g. return from finally)
- Additional Features (C# 1.1 vs Java 1.4)
  - Custom Attributes, Value Types, Unsafe Code, Delegates, Enums, Internal Access Modifier, Properties, Events, Conditional Compilation, Operator Overloading, Boxing, Variable Argument Lists, Checked Integer Arithmetic
- Java 5.0 adds some of the C# features
Class Libraries

- Like Java, the .NET Framework has a rich set of class libraries.
- The class library is a little bit more consistent than in Java.
- Major Parts
  - Base Framework
  - Data and XML
  - ASP.NET
  - Windows Forms
Class Libraries – Base Framework

- System
  - Collections
  - Configuration
  - Diagnostics
  - Globalization
  - IO
  - Net
  - Reflection
    - Emit
  - Resources

- System
  - Security
  - ServiceProcess
  - Text
  - Threading
  - Runtime
    - InteropServices
    - Remoting
    - Serialization
Class Libraries – Data and XML

- **System.Data**
  - OleDb
  - Common
  - SqlClient
  - SqlTypes

- **System.Xml**
  - Xslt
  - XPath
  - Serialization
Class Libraries – ASP.NET

- System.Web
  - Services
    - Description
    - Discovery
    - Protocols
  - UI
    - HtmlControls
    - WebControls
  - Caching
  - Configuration

- System.Web
  - Security
  - SessionState
Class Libraries – Windows Forms

- System.Windows.Forms
  - Design
  - ComponentModel

- System.Drawing
  - Drawing2D
  - Imaging
  - Printing
  - Text
Component Model

- Very nice component model, including design time support infrastructure.
- Demonstration!
Application Servers

- **ASP.NET**
  - Web sites
  - Web services
  - Typically hosted by IIS, but can also be hosted inside other HTTP servers.

- **COM+**

- **Windows Services**

- Like the JVM, you can host the CLR inside your own application.
Packaging / Deployment

- Assemblies
  - Extension of the Windows executable file format (PE files).
  - Can contain both managed as well as unmanaged code.
  - GAC / NGEN

- xcopy deployment
  - ASP.NET sites can be deployed by copying a directory. DLL files can be overwritten.
  - Many client applications can be xcopy deployed as well.
Versioning

- Assemblies can have a “strong name” and a version number.
- Publisher can set versioning policy.
- Domain/Local administrator can set versioning policy.
- Multiple versions can be loaded side-by-side.
- Demonstration!
Security Model

- Code Access Security
  - Declarative
  - Imperative
- Link Demands
- Isolated Storage
- Partially trusted code can read/write files through by using the standard file dialogs.
- Demonstration!
Integration with Legacy Code

- **P/Invoke**
  - Efficient and relatively easy way to call existing native code, without having to write glue code.
  - Demonstration!

- **Managed C++ / C++/CLI**
  - Very powerful way to write glue code for complex object models.

- **COM interop**
  - COM interfaces and objects can be used by .NET code and vice versa.
Java on the .NET Framework

- J#
  - JDK 1.1.4 only
  - Primarily a migration path for J++ users

- Third Party Tools
  - Come see my other talk!
Portability

- CLR
  - Windows x86/x64/IA64
- Compact Framework
  - Windows CE
- Shared Source CLI *a.k.a.* Rotor
  - Windows x86, FreeBSD, Mac OS X
- Mono
  - Windows x86, GNU/Linux x86/PPC, Mac OS X
- Portable.NET
  - GNU/Linux x86
Future

- Somewhere in 2005, version 2.0 of the .NET Framework 2.0 will be released.
  - Generics
  - C# language enhancements (generics, anonymous methods, iterators)
  - Many class library enhancements
  - C++/CLI
- The next version of Windows (Longhorn) will have an integrated CLR and many operating system components will be written as managed code.
Questions
Resources

- [http://www.sscli.net/](http://www.sscli.net/)
- [http://www.jasonbock.net/dotnetlanguages.html](http://www.jasonbock.net/dotnetlanguages.html)
- [http://www.mono-project.com/](http://www.mono-project.com/)
- [http://www.dotgnu.org/](http://www.dotgnu.org/)
- [http://weblog.ikvm.net/](http://weblog.ikvm.net/)