



An Introduction to .NET for the J2EE Programmer

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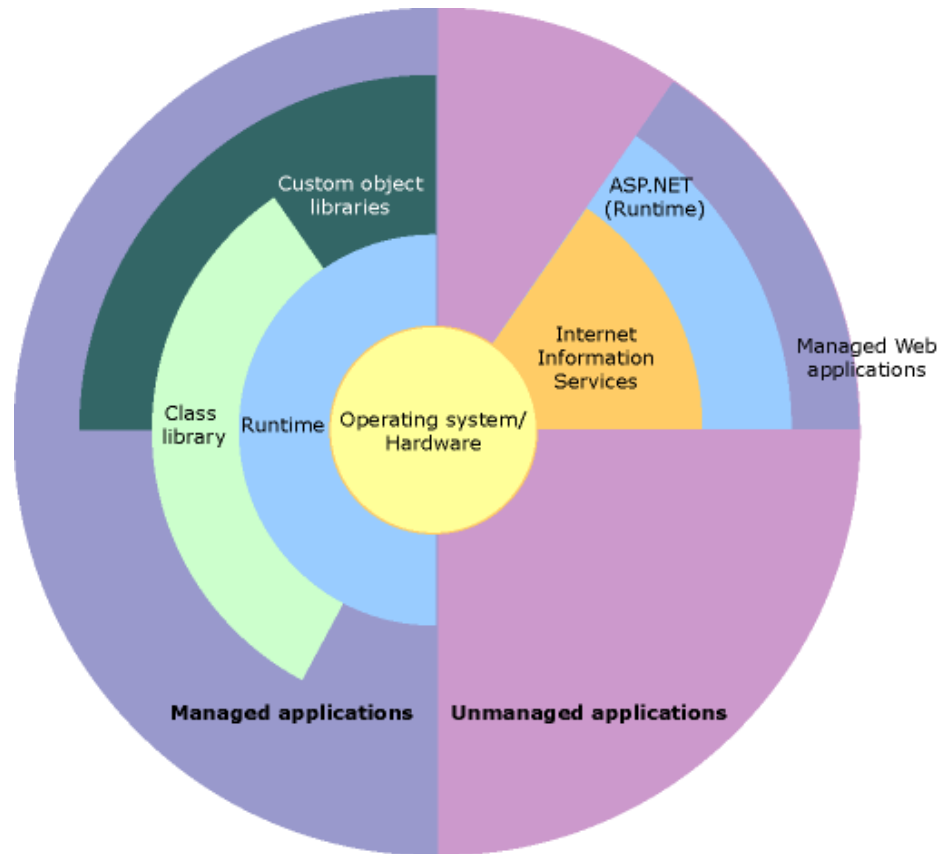




Overview

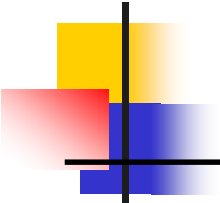
- .NET Framework overview and terminology
- A Quick Look at C#
- A detailed look at the important topics
 - Class Libraries
 - Component Model
 - Application Servers
 - Code Packaging / Deployment
 - Versioning
 - Security Model
 - Integration with Legacy Code
 - Portability

.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>

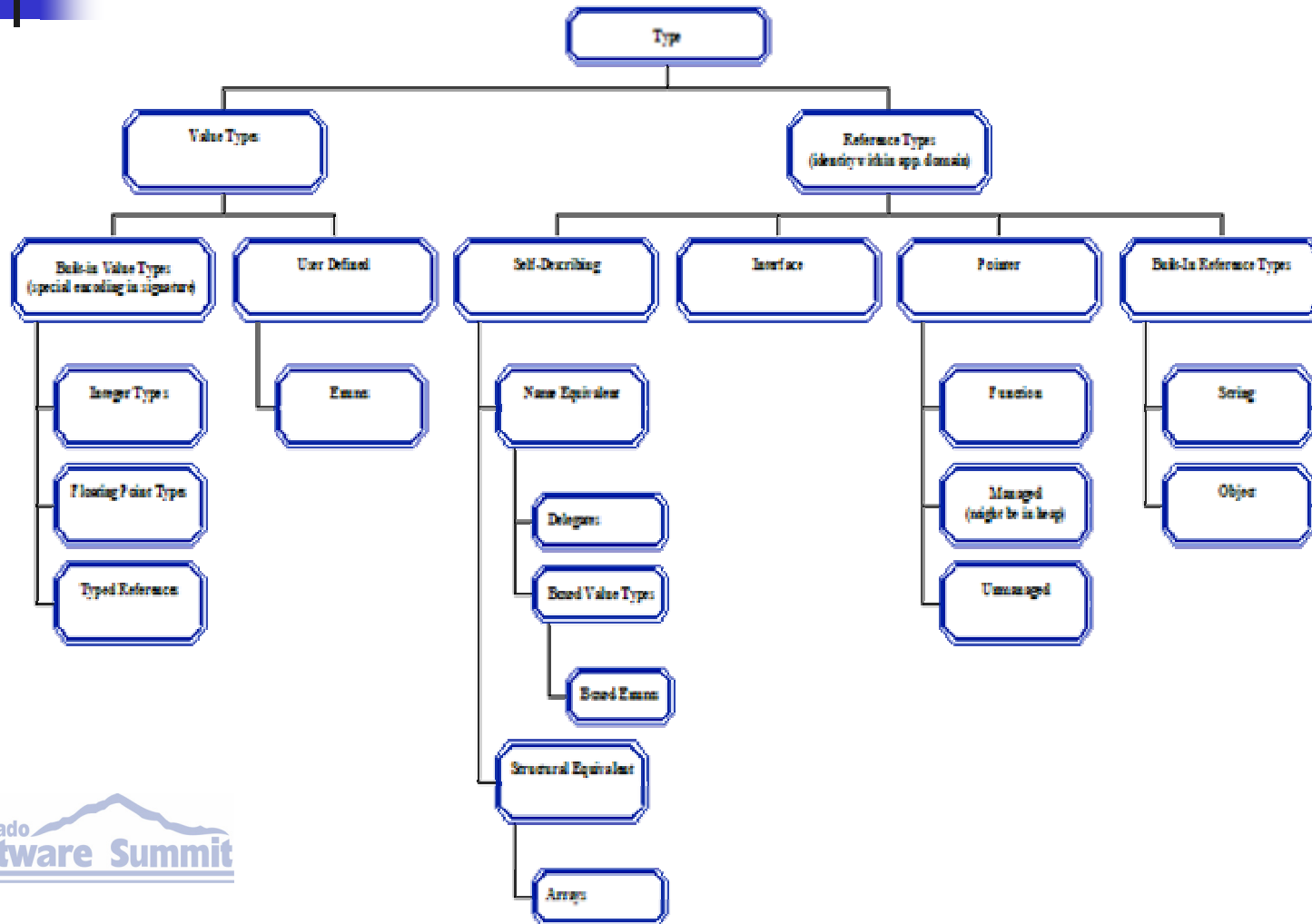


Common Language Specification

- **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



Common Type System



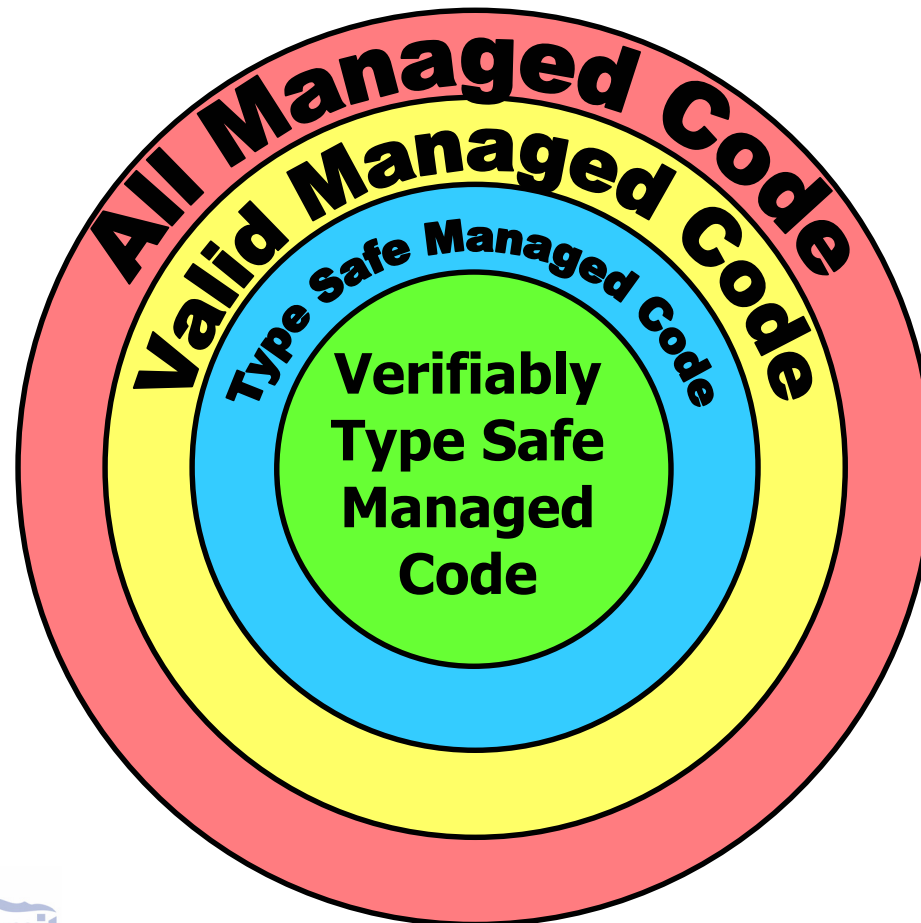


Virtual Execution System

- 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.

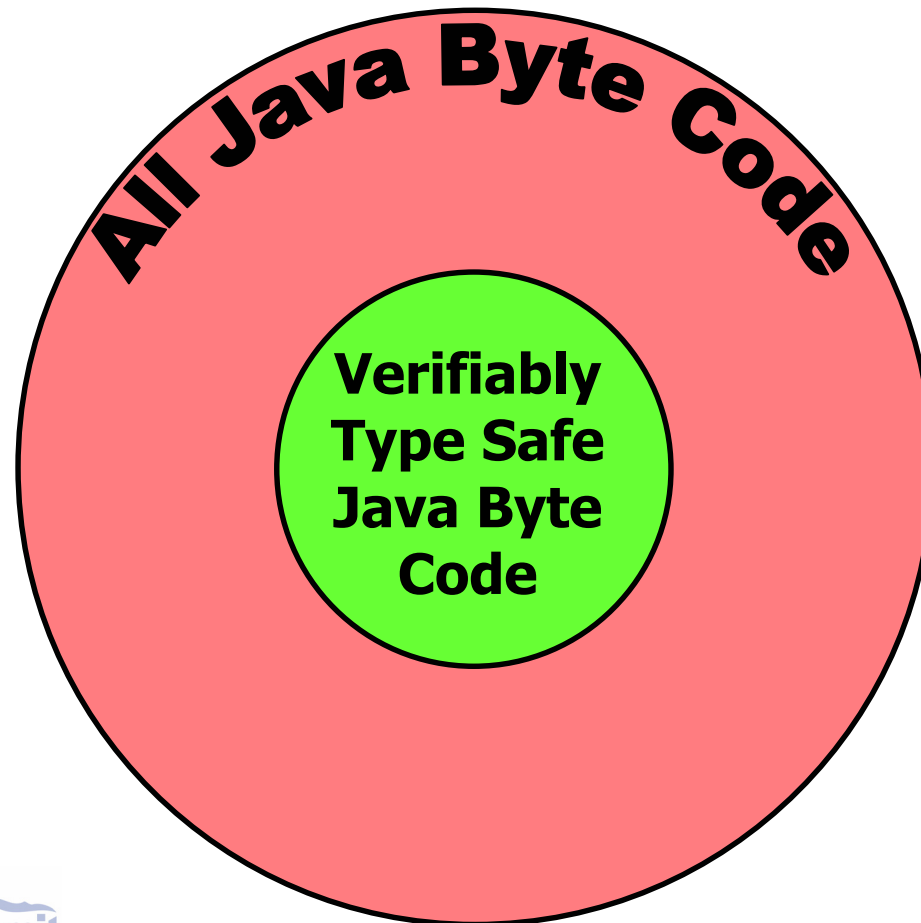


Managed Code





Java Byte Code

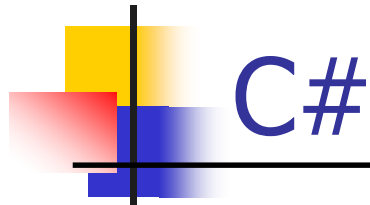




Managed Data

- 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.





- 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.jasonbock.net/dotnetlanguages.html>
- <http://www.mono-project.com/>
- <http://www.dotgnu.org/>
- <http://weblog.ikvm.net/>
- Microsoft has tons of interesting weblogs:
<http://blogs.msdn.com/>

