Einführung .NET Framework

Rajeswari Indupuri,
.NET – What Is It?

• Software platform
• Language neutral
• In other words:
  .NET is not a language (Runtime and a library for writing and executing written programs in any compliant language)
What Is .NET

• .Net is a new framework for developing web-based and windows-based applications within the Microsoft environment.

• The framework offers a fundamental shift in Microsoft strategy: it moves application development from client-centric to server-centric.
.NET – What Is It?

.NET Application

.NET Framework

Operating System + Hardware
Framework, Languages, And Tools

- VB
- VC++
- VC#
- JScript
- ...

Common Language Specification

- ASP.NET: Web Services and Web Forms
- Windows Forms

ADO.NET: Data and XML

Base Class Library

Common Language Runtime

Visual Studio.NET
Some Components from .NET

System.Web
- Services
- Description
- Discovery
- Protocols
- Caching
- Configuration

System.Data
- ADO
- SQL
- SQLTypes
- Design

System.Xml
- XSLT
- XPath
- Serialization
- Text

System_DRAWING
- Drawing2D
- Imaging
- Printing

System.WinForms
- Design
- ComponentModel

System
- Collections
- Configuration
- Diagnostics
- Globalization
- IO
- Net
- Reflection
- Resources
- Security
- ServiceProcess
- Text
- Threading
- Runtime
- InteropServices
- Remoting
- Serialization
The .NET Framework

.NET Framework Services

- Common Language Runtime
- Windows® Forms
- ASP.NET
  - Web Forms
  - Web Services
- ADO.NET, evolution of ADO
- Visual Studio.NET
Common Language Runtime (CLR)

• CLR works like a virtual machine in executing all languages.

• All .NET languages must obey the rules and standards imposed by CLR. Examples:
  - Object declaration, creation and use
  - Data types, language libraries
  - Error and exception handling
  - Interactive Development Environment (IDE)
Common Language Runtime

• Development
  – Mixed language applications
    • Common Language Specification (CLS)
    • Common Type System (CTS)
    • Standard class framework
    • Automatic memory management
  – Consistent error handling and safer execution
  – Potentially multi-platform
• Deployment
  – Removal of registration dependency
  – Safety – fewer versioning problems
Common Language Runtime

Multiple Language Support

- CTS is a rich type system built into the CLR
  - Implements various types (int, double, etc)
  - And operations on those types

- CLS is a set of specifications that language and library designers need to follow
  - This will ensure interoperability between languages
Compilation in .NET

- Code in VB.NET
- Code in C#
- Code in another .NET Language

- VB.NET compiler
- C# compiler
- Appropriate Compiler

- IL (Intermediate Language) code

- CLR just-in-time execution
Intermediate Language (IL)

- .NET languages are not compiled to machine code. They are compiled to an Intermediate Language (IL).

- CLR accepts the IL code and recompiles it to machine code. The recompilation is just-in-time (JIT) meaning it is done as soon as a function or subroutine is called.

- The JIT code stays in memory for subsequent calls. In cases where there is not enough memory it is discarded thus making JIT process interpretive.
Languages

- Languages provided by MS
  - VB, C++, C#, J#, JScript
- Third-parties are building
  - APL, COBOL, Pascal, Eiffel, Haskell, ML, Oberon, Perl, Python, Scheme, Smalltalk...
Windows Forms

• Framework for Building Rich Clients
  – RAD (Rapid Application Development)
  – Rich set of controls
  – Data aware
  – ActiveX® Support
  – Licensing
  – Accessibility
  – Printing support
  – Unicode support
  – UI inheritance
ASP.NET

- ASP.NET, the platform services that allow to program Web Applications and Web Services in any .NET language.

- ASP.NET Uses .NET languages to generate HTML pages. HTML page is targeted to the capabilities of the requesting Browser.

- ASP.NET “Program” is compiled into a .NET class and cached the first time it is called. All subsequent calls use the cached version.
• Logical Evolution of ASP
  – Supports multiple languages
  – Improved performance
  – Control-based, event-driven execution model
  – More productive
  – Cleanly encapsulated functionality
ASP.NET Web Forms

- Allows clean cut code
  - Code-behind Web Forms
- Easier for tools to generate
- Code within is compiled then executed
- Improved handling of state information
- Support for ASP.NET server controls
  - Data validation
  - Data bound grids
ASP.NET Web Services

• A technical definition
  – “A programmable application component accessible via standard Web protocols”
Web Services

• It is just an application…
• …that exposes its features and capabilities over the network…
• …using XML…
• …to allow for the creation of powerful new applications that are more than the sum of their parts…
ADO.NET
(Data and XML)

• New objects (e.g., DataSets)
• Separates connected / disconnected issues
• Language neutral data access
• Uses same types as CLR
• Great support for XML
Visual Studio.NET

- Development tool that contains a rich set of productivity and debugging features
.NET – Hierarchy, Another View

Diagram showing the hierarchy of components within the .NET framework:
- CLR
  - Custom object libraries
  - Class library
  - Runtime
  - Operating system/Hardware
- ASP.NET (Runtime)
- Internet Information Services
- Managed Web applications
- Managed applications
- Unmanaged applications
Summary

• The .NET Framework
  - Dramatically simplifies development and deployment
  - Provides robust and secure execution environment
  - Supports multiple programming languages
Comparison between J2EE and .NET
Comparison between J2EE and .NET Architectures
J2EE and .NET

Execution Engine

- **J2EE**
  - Java source code compiles into machine-independent byte code
  - Runtime Environment: JVM

- **.NET**
  - Any compliant language compiles into MSIL
  - Runtime environment: CLR

  Both JVM and CLR support services, such as code verification, memory management via garbage collection, and code security
Cross Platform Portability

- **J2EE**
  - Platform Independent
  - JDK should exist on target machine
- **.NET**
  - Supports Windows platform
  - CLR should exist on target machine
  - Can support other platforms provided it has its own JIT compiler
J2EE and .NET

Language Support

- J2EE
  Tied to Java
  Supports other languages via interface technology

- .NET
  Language independent
  Supports any language if mapping exists from that language to IL
Tools Support

- **J2EE**
  - Can employ any number of tools
  - **Pro**: Developer has a great deal of choice
  - **Con**: Difficulty in choosing a right tool for a given job

- **.NET**
  - Visual Studio.NET, single IDE for building an application
Resources

- http://www.microsoft.com/net
  - Microsoft .NET home
- http://msdn.microsoft.com/net
  - Microsoft .NET developers home
- http://msdn.microsoft.com/xml
  - Microsoft XML developers home
- http://msdn.microsoft.com/webservices
  - Microsoft Web Services developers home
- http://www.gotdotnet.com
  - Developers .NET resource