What Is .Net?

In A Fundamental Sense...

The Details Are Many And You Can Read About Those

It's A Big World

- There is a lot of very inexpensive computing power
- There is a lot of very inexpensive communications bandwidth
- There are a lot of cool things connected to the Network
- There are lots of visions about what the whole thing can do

Tremendous Potential

- Major business applications:
  - Web interface
  - Back-end database
  - User interaction for advanced applications
- Business-to-business application of retail technology
- Interconnected business information systems
- Look at the Walmart example...

This Is REALLY Important

- Service provision from the Network is a major opportunity
- The productivity impact is tremendous
- The opportunity for new services is tremendous
- Computing without the network is not going to realize the potential
- It is programming within the Network, not point-to-point communications

So What Is The Problem?

Why, the software of course...
Major Problem Areas
- Software in different languages
- Data in different formats
- Databases with different interfaces
- Communications protocols that can’t intercommunicate
- Security mechanisms that are inconvenient
- User interfaces that don’t interoperate
- Software is too hard to write
- Software is far too fragile

So What Is The Problem?
- Much of what we have built is inconsistent
- Actually, it is a real mess
- Suppose there were 50 different end-user voltage standards for power!
- There needs to be a complete and consistent infrastructure for Network applications
- That is what .Net is

The “Endian” Problem
- An (old) example of data representation inconsistency
  Byte addressing
  0 1 2 3 4 5 6 7
  1 0 3 2 5 4 7 6
  Half-word blocks
  Which byte do the most significant bits go in?

Why Do We Need Something Like .Net?

How Do You Build Software Out Of Programs?

Some Of The Problems...
- How do you find the other program(s)?
- How do you invoke other programs?
- How do you pass data or share data with other programs?
- How do you manage the resources in a mutually beneficial way?
- How do you deal with
In The Beginning...

Your Application  

C

Function

Some Other Application

C

Computer A

Data

Some Other Application

Fortran

Computer B

Then There Were Objects...

Your Application

C++

Method

Some Other Application

C++

Computer A

Method

Some Other Application

C++

Computer B

- Object interface semantics
- Interface definition—paper not executable
- Which version of the object?

An Example

Your Application

Microsoft Word

My Document

Access document as an object using a well-defined software interface with semantics "equivalent" to being inside your application

Contracts

- What needs to be in a contract?
- How would a contract be defined?
- How would a program find out what a contract was?
- How would a program find out what version of the available services was used?

Contracts

- How would one implement a contract mechanism in practice?
  - Function invocation, i.e., the calling convention
  - Parameter/data formats
  - Memory management (method call => stack frame
  - Exception management
  - Threads, etc.
  - Security
- Is any of this going to work across languages?

What Is .Net?

- Extensive execution-time features with serious functionality (.Net Framework):
  - Portability, version management
  - Memory management, lang. independence
  - Access protection, OS API
  - Comprehensive object interface exposed
  - Enhanced Active Server Pages for providing Web page user interfaces (ASP.Net)
What Is .Net?
- Standard server interface functions accessed using XML and HTTP (.Net Web Services)
- An application generator that facilitates the construction of high-quality application user interfaces (.Net Windows Forms)
- Database access/integration support via Active Data Objects (ADO.Net)

Common Language Runtime
- All .Net languages:
  - Compile to MSIL
  - Use JIT compilers
  - Use common representations
- Common Language Runtime (CLR):
  - Consistent set of services for all languages
  - Comprehensive name management
  - Entirely new contract mechanism
- What is the role of MSIL in contracts?