

VSE .Net Programming

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.NET Programming Example with VSE

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Agenda

- Introduction to .NET
- Using the Windows Socket Interface
 - Socket Class
 - System.Net.Sockets namespace
 - Sample program
- Using the request/response model
 - WebRequest & WebResponse Classes
 - System.Net.WebRequest namespace
 - Sample programs

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VSE .Net Programming

Introduction to .NET

- Windows programming and execution environment from Microsoft
- Microsoft .NET Framework supports multiple programming languages
 - Visual Basic
 - Visual C#
 - Visual J#
 - Visual C++
 - Many third party languages (Perl, COBOL)



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Introduction to .NET...

- .NET Framework supports multiple environments
 - Windows form applications
 - Windows console applications
 - Windows services
 - ASP .NET web applications
 - ASP .NET Web Services
 - Class Libraries (DLLs)
 - MS Office applications



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Introduction to .NET...

- Common Language Runtime (CLR)
 - Manages
 - Code execution
 - Memory
 - Security
 - Managed Code uses the CLR
 - Unmanaged code does not use the CLR
 - Structured exception handling



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Introduction to .NET...

- .NET Class Library
 - Collection of interfaces and classes
 - More than 6,000
 - All object-oriented
 - Provides access to many many services
- Code compiled to Microsoft Intermediate Language (IL)
- CLR uses Just-In-Time (JIT) compiler to convert IL into native executable code



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Introduction to .NET...

- Interoperable between languages
 - All languages compile to the same IL
- Program files (.exe) are called Assemblies
 - IL
 - Metadata (identity, dependencies, security...)
 - Resources (icons, images...)



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Introduction to .NET...

- Visual Studio .NET
 - Integrated Development Environment (IDE)
 - Manages projects
 - Multiple solutions
 - All files required
 - Generates skeleton program from templates
 - Builds solutions
 - Interactive debugger



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Using the Windows Socket Interface

- Used to tightly control access to the network
- Classes in System.Net and System.Net.Sockets namespace
- Can be used in synchronous (single thread) or asynchronous (multi-thread) applications



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Classes Used in Sync Socket Example

- IPAddress
 - Class to provide an Internet IP address
 - Domain name
 - IP V4 or V6 address
- IPEndPoint
 - Class represents a network endpoint
 - IP address
 - IP address family
 - Port number



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Classes Used in Sync Socket Example

- Socket
 - Implements Berkeley Sockets Interface
 - Supports many protocols
 - IP (v4)
 - IPv6
 - ICMP
 - TCP
 - UDP
 - + Others



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Classes Used in Sync Socket Example

- Socket...
 - Supports various socket types
 - RAW
 - DGRAM
 - Stream
 - Supports many types of addressing
 - AppleTalk
 - Banyon
 - DecNet
 - IPX
 - InterNetwork



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Example Sync Socket Client

- Server running in VSE partition
- Uses CSI assembler Socket macro API
- Sample multitasking Server from CSI samples web site

<http://www.e-vse.com/csi/csi-products/TCPIP/Samples/SAMSEVR.ZIP>



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Example Sync Socket Client...





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Example Sync Socket Client...

```
' Set up connection control blocks
'
Dim ipAddress As IPAddress = IPAddress.Parse(txtIPAddr.Text)
Dim remoteEP As New IPEndPoint(ipAddress, txtIPPort.Text)
Dim mySock As New Socket(AddressFamily.InterNetwork, _
    SocketType.Stream, ProtocolType.Tcp)
```



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Example Sync Socket Client...

```
' Connect to the remote server
Try
    mySock.Connect(remoteEP)
    IsConnected = True
Catch ane As ArgumentNullException
    StatusBar.Text = "ArgumentNullException: " +
        ane.ToString()
Catch se As SocketException
    StatusBar.Text = "SocketException: " + se.ToString()
Catch e As Exception
    StatusBar.Text = "Unexpected exception: " +
        e.ToString()
End Try
If IsConnected = False Then
    StatusBar.Text = "Connection failed."
Else
    Dim noDataRec As Boolean = False
    Dim bytesRec As Integer = 0
```



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Example Sync Socket Client...

```
' Set Timeout on Send and Receive
'
mySock.SetSocketOption(SocketOptionLevel.Socket,
    SocketOptionName.SendTimeout, 1000)
mySock.SetSocketOption(SocketOptionLevel.Socket,
    SocketOptionName.ReceiveTimeout, 1000)
```



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Example Sync Socket Client...

```
' Send request to the server
'
Dim msg As Byte() =
    Encoding.ASCII.GetBytes(txtRequest.Text + vbCrLf)
Dim bytesSent As Integer = mySock.Send(msg)
' Receive response from server
'
Do Until noDataRec
    Try
        bytesRec = mySock.Receive(Bytes)
    Catch se As SocketException
        bytesRec = 0 ' Receive timed out
    End Try
```



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Example Sync Socket Client...

```
' Terminate the socket connection
'
If IsConnected = True Then
    mySock.Shutdown(SocketShutdown.Both)
    mySock.Close()
End If
```



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Request/Response Model

- Simple API for many of the protocols used on Internet
- Implementation of network services that enables you to develop applications that use Internet resources without worrying about details of individual protocols
- Classes in System.Net namespace
- Can be used in synchronous or asynchronous applications



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Classes Used in Request/Response Example

- **WebRequest &WebResponse classes**
 - ▣ Classes access data from Internet in a protocol-agnostic manner
 - ▣ Application works with instances of the class while protocol-specific descendant classes carry out the details of the request
 - URI determines the proper descendant class to create
 - ▣ **HttpWebRequest / HttpWebResponse**
 - ▣ **FileWebRequest / FileWebResponse**

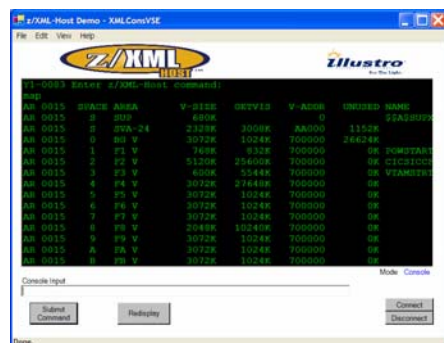


Example Request/Response Clients

- Server is z/XML-Host running on VSE
- Uses assembler Socket macro API
- Two example programs
 - HTTP GET request example
 - HTTP POST request example



Example Request/Response Clients...



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Example Request/Response Client 1

```
' Define objects
Dim wr As WebRequest
Dim ws As WebResponse
Dim cLine As String
```



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Example Request/Response Client 1...

```
' Try to send the request and get the response
Try
wr = WebRequest.Create(sTheRequest)'Create request object
ws = wr.GetResponse()' Send request and get the response
sr = New StreamReader(ws.GetResponseStream(),
    Encoding.ASCII)
```



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Example Request/Response Client 1...

```
cLine = sr.ReadToEnd() 'Read entire document
doc.LoadXml(cLine) 'Load the text into xml doc
Catch oEX As Exception
MsgBox(oEX.Message)
Finally
sr.Close() 'Close stream reader
ws.Close() 'Close WebResponse
End Try
```



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Example Request/Response Client 2

```
Dim reqDataLen As Integer = sXMLDocRequest.Length
Dim reqData(reqDataLen) As Byte
For i = 0 To reqDataLen - 1
    reqData(i) = Asc(sXMLDocRequest.Substring(i, 1))
Next i
' Try to send the request now
Try
    Dim httpRequest As HttpWebRequest = _
        CType(WebRequest.Create(sTheRequest), _
            HttpWebRequest) 'Create a new request object
    httpRequest.Method = "POST"
    httpRequest.ContentLength = reqDataLen
    httpRequest.ContentType = "text/xml"
    httpRequest.KeepAlive = False
    Dim sendStream As Stream = httpRequest.GetRequestStream()
```



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Example Request/Response Client 2...

```
sendStream.Write(reqData, 0, reqDataLen) 'Write to stream
sendStream.Close()
ws = httpRequest.GetResponse() 'Send request/get response
sr = New StreamReader(ws.GetResponseStream(),
    Encoding.ASCII)
cLine = sr.ReadToEnd() 'Read entire document
doc.LoadXml(cLine) 'Load text into the xml document
Catch oEX As Exception
    MsgBox(oEX.Message)
Finally
    sr.Close() 'Close stream reader
    ws.Close() 'Close WebResponse
End Try
```



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Summary

- We have many ways to use VSE as a data server; the .NET Framework is an easy facility to use for programming Windows clients
- Use the Sockets class to tightly control Internet protocols
- Use the WebRequest and WebResponse classes for more generic application programming for HTTP



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