

Leveraging Microsoft .Net to Build IBM i Applications

An Introduction to VB.Net and ASP.Net for IBM i Developers

Presented by
Richard Schoen /RJS Software Systems
Email: richard@rjssoftware.com
Phone: 888-RJSSOFT

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www.rjssoftware.com

Presenter Information

- **Richard Schoen**
- **President/CTO - RJS Software Systems, Inc.**
- **Has developed software for over 26 years**
- **Started out on the System 34/36 in mid 1980's**
- **Has been through the pain of learning PC and web dev.**
- **Knows RPG,CL,VB,C,C#,Java,JSP,ASP**
- **Has worked with PHP, Ruby and other misc languages**
- **Develops AS/400-iSeries-IBM i, Windows and Linux software software for a living**
- **Cares about AS/400-iSeries-IBM i Developer's future**

About RJS Software

- **Software Developer**
- **Founded in 1990 in Minneapolis**
- **Product focus:**



RJS .Net Offerings

- RJS Offers .Net Training via formal classes
- Classes can be attended offsite at RJS location.
- Classes can be delivered onsite.
- Mentorship program provides hands on .Net development working side by side with instructor using your data.
- Class content can be customized.
- Also offer Microsoft Sharepoint integration and training.
- sales@rjsssoftware.com -or- 888-RJSSOFT

RJS RPG2SQL Integrator Product

- **RPG2SQL allows RPG programs to read/write to SQL Server, Oracle, MySQL and other databases**
- **RPG2SQL can also read/write Microsoft Excel spreadsheets**
- **Allows RPG programmers to access any spreadsheet or database real-time without replication**
- **Great for mixed platform environments**
- **sales@rjsssoftware.com -or- 888-RJSSOFT**

Overview

- **This session will be a chance for IBM i developers to learn more about how VB.Net and ASP.Net technologies can be used to quickly create Windows and Web applications that can access IBM i programs and data.**
- **Build value into your IBM i system by showing the network guys how the IBM i can be used as a database backend for Windows desktop and web applications.**

Agenda

- **Why modernize ?**
- **Why learn a new development language ?**
- **Available PC/Web development environments**
- **Why Microsoft .Net technology ?**
- **Overview of Microsoft Visual Studio 2010**
- **Build Sample VB.Net / ASP.Net Applications**
- **Using IBM Java Toolbox in .Net development**

Why modernize ?

- **Your company just hired a young CFO or CIO who only knows Windows**
- **Your company has a mixed camp of iSeries and PC developers**
- **Your company wants to share information with customers and suppliers**
- **Want to update iSeries user interfaces**
- **Dispell misconceptions that the iSeries is not player in the windows/web environment**
- **Utilize existing database info on the iSeries**
- **Utilize existing and new RPG/CL/COBOL code**

Why modernize ?

- Don't throw away years of working app code
- Times have changed. Multiple system platforms in most shops today.
- Every iSeries developer should minimally know HTML and Javascript
- HTML is DDS for the web
- Javascript provides logic for web pages
- No matter what Web technology you use, HTML and Javascript are part of it
- Learn a Windows/Web development technology
- Your career depends on it

Example Scenario 1

The New CIO

- **New 30-40 something CIO/CEO is hired**
- **Hates green screen applications**
- **Wants to dump the iSeries because it's legacy technology (whatever that is 😊)**
- **Has the PC/network guys on his side**
- **Looking at SAP, Oracle or some other PC server based software with a several million dollar and several year implementation price tag.**
- **Is convinced the iSeries is a dinosaur**
- **CIO/CEO will probably be gone in a few years moving up the ladder**

Possible Way to Address Scenario 1

- **Sit down with the CIO/CEO and talk about their concerns**
- **After hearing the concerns, discuss how you can build GUI Windows or Web apps for inquiry**
- **Build him/her that cool, gee-whiz drill down application to view sales summary info**
- **Talk to the PC/network guys about how iSeries can be used from languages like VB.Net, C#, ASP.Net**
- **A little GUI can go a long way in PR value**

Example Scenario 2

iSeries vs the Network Guys

- **Company has a split camp of Windows Developers and iSeries developers**
- **Windows team is convinced that all iSeries systems should be re-written and removed from the iSeries**
- **They are convinced they can't access the iSeries database**
- **Convinced that iSeries is the devil**

Possible Way to Address Scenario 2

- **Sit down with the Windows development team to discuss app needs**
- **Teach them how to access the iSeries directly from Windows or Web apps**
- **Talk about how the teams can work together to re-use existing, centralized iSeries program logic**
- **This educates the Windows team on the iSeries**
- **This allows iSeries developers to hone their skills by learning new technologies**
- **Everybody can win**

Educating on iSeries Value

- **As iSeries professionals it's up to us to educate our management on the platform**
- **Discuss how it plays well with other systems**
- **Discuss how it can be used with .Net, Java, PHP and other languages**
- **Discuss how it can run multiple platforms in one box: Windows, Linux, OS/400, Domino, Websphere**
- **Open the communications lines**
- **Illustrate by writing a prototype application that actually use the new technologies.**

PC Development Environments Today

- **Java/JSP/Websphere/Eclipse/WDSC/RDI/RDP**
- **Microsoft Visual Studio (ASP.NET/VB.Net/C#)**
- **RPG/Cobol/CGI/RPG Smart Pages/Etc.**
- **PHP/Zend Core**
- **Ruby on Rails**
- **Several other open source variants**
- **Several tool vendors as well**
- **Differing opinions on which is best**

Top Two Environments

Websphere Developer/WDSC/RDI/RDP/Eclipse

- Can be used to develop - Java/JSP/PHP etc.
- Can develop GUI and web java apps
- Can be used for RPG development (WDSC/RDI/RDP)

Microsoft Visual Studio

- Can be used to develop - ASP.NET/VB.Net/C#
- Can develop GUI and web apps
- Can also be used to develop java when used with Mainsoft tools. <http://www.mainsoft.com>

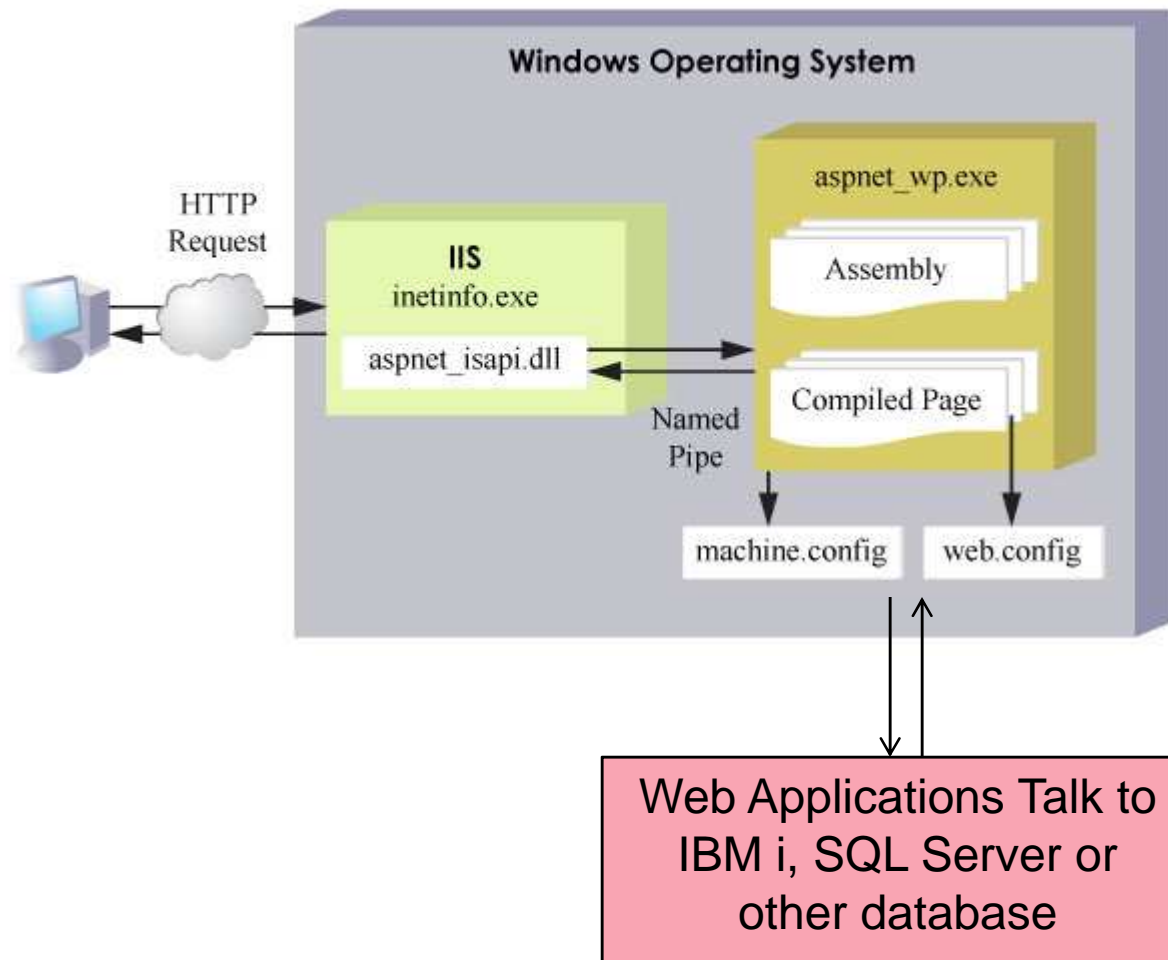
What is VB.Net technology ?

- **Acronym: Visual Basic for .Net**
- **Used for desktop application development**
- **Can be used in web application development**
- **Can be used in for web service development**
- **VB.Net is part of the Microsoft .Net Framework**
- **Microsoft .Net Framework improved upon Sun Java runtime for Windows and Web application**
- **Can use C# or VB for coding business logic**
- **Can intermix C# and VB if desired 😊**
- **Can write complete desktop applications much faster**
- **Mature technology – Around since 2002**
- **Visual Studio 2010 released in April 2010**

What is ASP.Net technology ?

- **Acronym: Active Server Pages for .Net (ASP.Net)**
- **Used for web application development**
- **Used for web service development**
- **ASP.Net is part of the Microsoft .Net Framework**
- **Microsoft .Net Framework improved upon Sun Java runtime for Windows and Web application**
- **Allows HTML logic to be separate from business logic**
- **Cleaner code with HTML and logic separation**
- **Can use C# or VB for coding business logic**
- **Can write complete web applications quickly**
- **Mature technology – Around since 2002**
- **Visual Studio 2010 released in April 2010**

ASP.Net Web App Process Flow



Why use .Net technology ?

- VB.Net and ASP.Net are easy to learn. Very english-like code
- Can get started with very little code
- Don't need a lot of experience to get started
- Provide quick wins with management
- Can use existing iSeries programs and data in windows/web apps
- Can consume web services
- No initial XML knowledge needed for using web services
- FREE Development Environment (Visual Studio Express)
<http://www.microsoft.com/express>
- Can get started with very little code

Similarities between VB.Net and RPG

Form Level Variables and D-Specs

```
'*-----  
'* VB Field declaration section  
'*-----
```

```
Dim sUser as String  
Dim iCount as Integer
```

```
D*-----  
D* RPG Field declaration section  
D*-----  
DSUSERID          S          50A  
DICOUNT           S          10I 0
```


Similarities between VB.Net and RPG

Subfile-style functionality to view or edit pages of data

In VB.Net we use the DataGridView control to simulate subfile functionality. The grid control hold multiple rows and columns of data that can be displayed or edited.

In RPG we use a display file and a subfile control and subfile display panel to display pages of data.

Similarities between VB.Net and RPG

Error Handling

In VB.Net we typically use the Try/Catch Mechanism to monitor and handle errors:

Try

```
'Try to do something.
```

Catch ex As Exception

```
'If errors occur, drop to here and do something.
```

```
'This example simply displays an error message.
```

```
'Display error message if error occurs
```

```
MsgBox(ex.Message)
```

End Try

Similarities between VB.Net and RPG

Error Handling

In RPG we can use the MONITOR-ENDMON block to handle errors.

```
/free
  monitor;
  myDate = %date( myDateWithSep : *USA );
  on-error ;
  // handle error
  dsply error ;
  endmon ;
  *inlr = *on ;
/end-free
```

In iSeries CL programs we use MONMSG to monitor for errors

```
MONMSG          MSGID(CPF0000) EXEC(GOTO ERRORS)
```

Similarities between VB.Net and RPG

Comments

In VB.Net, comments all start with a single quote

```
'-----  
' I am a comment in a VB program  
'-----
```

In RPG, all comment lines begin with a * is position 7 or // in RPG-Free

```
C* -----  
C* I am a comment in a regular RPG C-spec  
C* -----  
  
// -----  
// I am a comment in an RPG-Free code line  
// -----
```

Similarities between VB.Net and RPG

Program Startup

In VB.Net we have the Form-Load event that occurs on program startup.

```
Private Sub Page_Load(ByVal sender As Object, ByVal e As  
    System.EventArgs) Handles Me.Load
```

```
'Do some startup code such as load settings.
```

```
End Sub
```

```
Sub Main
```

```
'Do some startup code for a Windows service or  
'background application with no interface
```

```
End Sub
```

Similarities between VB.Net and RPG

Program Startup

In RPG, we have the *INZSR subroutine that can be used to perform program startup

```
* Program initialization routine
C *InzSr          BegSR
  * Entry parms
C *Entry          Plist
C                 Parm          Parm1
C                 Parm          Parm2
C                 Parm          Parm3
C                 Parm          Parm4
C                 Parm          Parm5
  *
C                 EndsR
```

Similarities between VB.Net and RPG

Program Shutdown/Termination

In VB.Net we have the FormClosing event that occurs on program shutdown.

```
Private Sub Form1_FormClosing(ByVal sender As Object,  
    ByVal e As System.Windows.Forms.FormClosingEventArgs)  
    Handles Me.FormClosing
```

```
'Do some shutdown code here such as save settings.
```

```
End Sub
```

In RPG we usually set on the LR indicator and return from the program.

```
C          Eval          *INLR = *ON  
C          Return
```

Similarities between VB.Net and RPG

Source Code Includes or Copy Books

In VB.Net a class or code module is a way to share source code such as functions or subroutines that can be used across multiple programs and web pages.

In RPG and COBOL this would be similar to using a copy book or source member include in an RPG or COBOL program to include shared code or sub-procedures.

In this scenario the source code is shared across each program that uses the shared code.

If the shared code changes, all programs that use the shared code will pick up the changes the next time they get recompiled.

Similarities between VB.Net and RPG

Service Programs and Class Libraries

In VB.Net a compiled class module is called a **Class Library**. A compiled class library can be referenced and used by any VB.Net program or ASP.Net web page.

In RPG or COBOL a shared compiled code module is called a service module or service program.

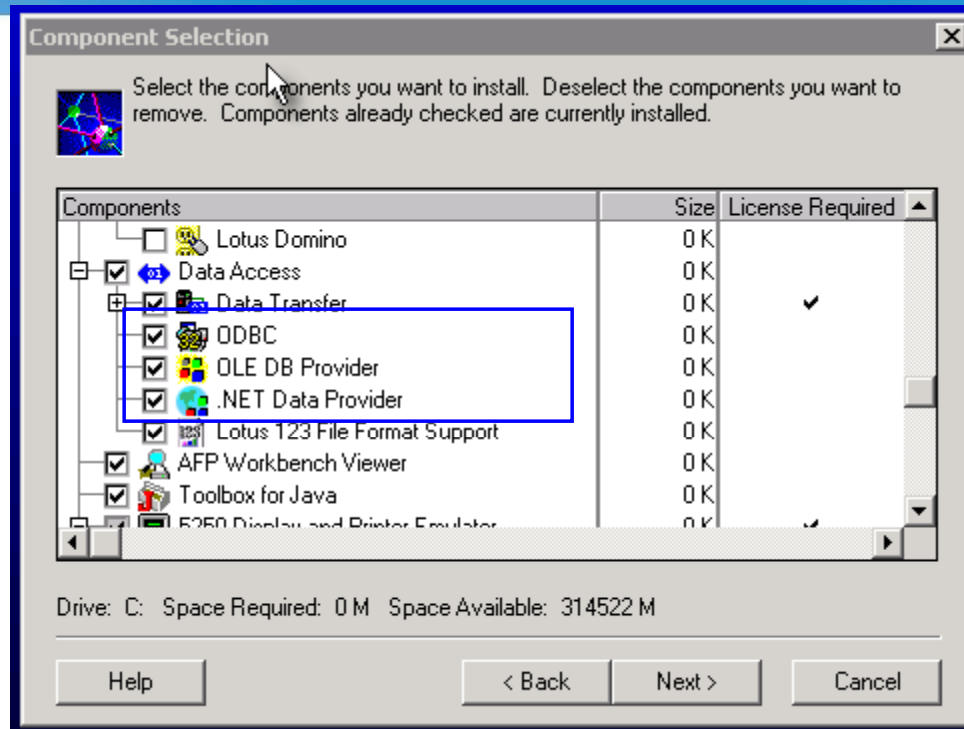
In this scenario the code is pre-compiled into a binary DLL file object that can be referenced by other programs.

VB.Net Class libraries can store Windows forms as well as shared code routines. An example of this might be a shared iSeries login screen that can be used across all of your Windows applications that will connect to the iSeries.

Prerequisites for VB.Net Development

- Microsoft Visual Studio 2005/2008/2010
- FREE version of Visual Studio 2010 Express
<http://www.microsoft.com/express>
- IBM iSeries Access/400 ODBC, OLD DB or ADO.Net database provider.
**Installed with iSeries access.

Installing iSeries Access Database Drivers



- Run iSeries Access Setup and Select ODBC, OLE DB and .Net Data Providers
- Needs V5R3 and above for .Net Data Provider
- **Use V6R1 if possible.** Works back to V5R1

Connecting to the iSeries from .Net

- iSeries Data can be accessed via any of the following CA/400 database drivers
- ODBC driver (Dates back to mid nineties)
- OLEDB driver (Dates back to late nineties)
- ADO.Net driver (2002-2003) ← **Preferred**
- Why are there 3 drivers ?
- Evolution

Using ODBC, OLEDB or ADO.Net database driver ?

- ODBC driver is oldest method of access
- OLEDB driver is next generation
- ADO.Net driver is managed driver
- OLEDB has ability to access iSeries database, CL commands or programs very easily
- ODBC, OLEDB and ADO.Net are relatively interchangeable because of .Net data adapters
- Connection Code is almost identical for All 3
- **Once you know these, you can connect to other databases such as MySQL, SQL Server, etc..**

Introduction to Visual Studio 2010 Environment

- **Free version called Visual Studio Express**
- **Start the environment**
- **Discover the Toolbox**
- **Discover Project Types**
- **Discover Solution Explorer**
- **Discover the Error List**
- **Discover the ToDo-List**

Introduction to Visual Studio 2010 Environment

- **Most important controls to learn**
- **Label** – fixed/static text
- **Text box** – data entry field
- **Button** – execute/run an action.
- **Menu** – execute/run an action via pulldown menu
- **DataGrid** – Subfile for VB.Net Holds multiple rows of data that can be viewed or manipulated.
- **Focus on these until you get comfortable**

3rd Party VB.Net Visual Components

- **Infragistics Netadvantage**
<http://www.infragistics.com>
- **Telerik**
<http://www.telerik.com>
- **Componentsource**
<http://componentsource.com>

Develop a Sample VB.Net Inquiry and Maintenance

- Let's develop a simple inquiry using file QCUSTCDT in library QIWS on the iSeries
- Will ask for a customer number entry
- Will display a list of all matching customer records in a data grid.

- **Very similar to a subfile inquiry**

iSeriesSubFileSample1 – Simple Inquiry

iSeriesSubFileSample2 – Simple Inquiry with paging

iSeriesSubFileSampleCRUD1 – Simple maintenance

<http://downloads.rjssoftware.com/files/commonclasses/2010/vbspring2010.zip>

Develop a Sample Remote Command Caller

- Let's develop a simple remote command line called that calls any iSeries command line.
- Will ask for command line entry
- Will display success or failure

iSeriesCommandCall1

<http://downloads.rjssoftware.com/files/commonclasses/2010/vbspring2010.zip>

Develop a Sample Remote Program Caller

- Let's develop a simple program caller any iSeries program with parms and returns parms.
- Click button to run sample program call routine
- Calls program without needing to register as Stored Procedure (Uses iSeries OLE DB driver)
- Will display return parms

iSeriesProgramCall1- Call program directly

iSeriesProgramCallSP1 – Call program as stored procedure

<http://downloads.rjssoftware.com/files/commonclasses/2010/vbspring2010.zip>

Develop a Sample ASP.Net Inquiry

- Let's develop a simple inquiry using file QCUSTCDT in library QIWS on the iSeries
- Will ask for a customer number entry
- Will display a list of all matching customer records in a browser
- Very similar to a subfile inquiry for the web
- Sample Code Project:

iSeriesASPNetWebSubFile1

<http://downloads.rjssoftware.com/files/commonclasses/2010/aspnetspring2010.zip>

Develop a Sample ASP.Net Web Service

- A web service is a new way to call existing programs or talk to databases over an HTTP connection.
- Let's develop a simple web service to retrieve a customer record from file QCUSTCDT in library QIWS on the iSeries
- Will ask for a customer number entry
- Will return a list of all customer fields as an XML dataset that can be processed by any program that can call a web service.
- **Sample Code Project:**

iSeriesASPNetWebService1

<http://downloads.rjssoftware.com/files/commonclasses/2010/aspnetspring2010.zip>

Develop a Sample ASP.Net Web Service Consumer/Caller

- Let's develop a simple windows program to call our web service.
- Will read an XML dataset and display in a grid.
- Sample Code Project:

iSeriesASPNetWebService1

<http://downloads.rjssoftware.com/files/commonclasses/2010/aspnetspring2010.zip>

Develop a Sample ASP.Net CRUD Maintenance Program

- Let's develop a simple maintenance using file QCUSTCDT in library QIWS on the iSeries
- Will display a list of all matching customer records in a browser subfile.
- Can insert, update, delete records.
- Sample Code Project:

iSeriesASPNetWebSubFileCRUD1

<http://downloads.rjssoftware.com/files/commonclasses/2010/aspnetspring2010.zip>

Using IBM Java Toolbox in .Net Apps

- **JT400 toolbox has a lot of functionality**
- **Supports SQL DB access via JDBC calls**
- **Supports Record-Level access to DB**
- **Supports Remote Program Calls**
- **Supports Command Line Calls**
- **Supports Data Area Access**
- **Supports Data Queue Access**
- **Supports Reading/Writing PC Files to IFS**

Using IBM Java Toolbox in .Net Apps

- RJS has “.Net-ified” JT400
- Used a Java runtime product called IKVM
- Compiled JT400 so .Net developers can use it
- The JT400 and IKVM are FREELY available and open source
- RJS has built a higher-level, less code intensive supported commercial offering called RJS iSeries Data Access Provider for .Net
- Provides .Net jump-start to .Net developers
- Provides quick access to all JT400 functionality with minimal learning curve

Summary/Feedback

- Discussed reasons for modernization
- Received an overview of the Microsoft Visual Studio 2010 development environment
- Learned about VB.Net and ASP.Net
- Reviewed several code samples
- Please **DO SOMETHING** with these examples 😊
- Questions/feedback to: richard@rjssoftware.com

Session Download URLs

- VB.Net Sample Code and Projects
<http://downloads.rjsssoftware.com/files/commonclasses/2010/vbspring2010.zip>
- ASP.Net Sample Code and Projects
<http://downloads.rjsssoftware.com/files/commonclasses/2010/aspnetspring2010.zip>
- Slide Presentation
<http://downloads.rjsssoftware.com/files/classes/quser2011/quserfeb2011.pdf>

Richards Email: richard@rjsssoftware.com

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