

## Access APL+Win as a COM Object from .Net

The System.Runtime.InteropServices .Net namespace provides support for COM in .Net. Using this namespace a Win32 COM object (ActiveX server), e.g. APL+Win (aplwco.dll), can be accessed from .Net.

When a type library of a COM object is referenced by a .Net project in Visual Studio 2008, an 'Interop' .dll for that type library is automatically created for that project .

To facilitate easy use of APL+Win as a COM object, a C# class library (.Net assembly) has been created which will:

- Create an instance of the APL+Win com object when an instance of this .Net class is created
- Provide .Net methods which provide support for all the methods and properties of the APL+Win com
- Provide a .Net method to close the APL+Win com object use the Microsoft-recommended methodology

Here is the outline of steps to use this "APLComCsHelper.dll" class library:

- Before APL+Win can be accessed from .Net as a COM object, aplwco.dll and APLW.exe (or their run-time equivalents) must be registered as COM objects on the machine. The APL+Win Windows Interface documentation provides instructions for performing this registration. This documentation is installed to the programmer's machine when APL+Win is installed.
- Download and then open the "APLComCsHelper" solution in Visual Studio 2008.
- In addition to the "APLComCsHelper.dll", this solution contains two 'test harness' console projects. The console project which is marked in the Solution Explorer as the "StartUp Project" will use the "APLComCsHelper.dll". In Visual Studio 2008, Debug the "APLComCsHelper" solution to check that the 'test harness' console project runs properly. If it does not run properly, it is likely that Aplwco.dll or aplw.exe are not properly registered on the programmer's machine or the reference to the APLW type library in the "APLComCsHelper.dll" project in the solution needs modification.
- Examine the source code of the "test harness" console projects to see how the "APLComCsHelper.dll" is used. There is a VisualAPL and a C# console project provided illustrating the use of APL+Win as a come from VisualAPL and C# respectively.

Some potential uses for accessing APL+Win as a COM object from .Net:

- Use APL+Win functions which have not yet been converted to VisualAPL
- Use APL+Win functions from C#
- Move data from APL+Win to the .Net environment in VisualAPL or C#. With appropriate user-defined variables or functions in the APL+Win workspace.

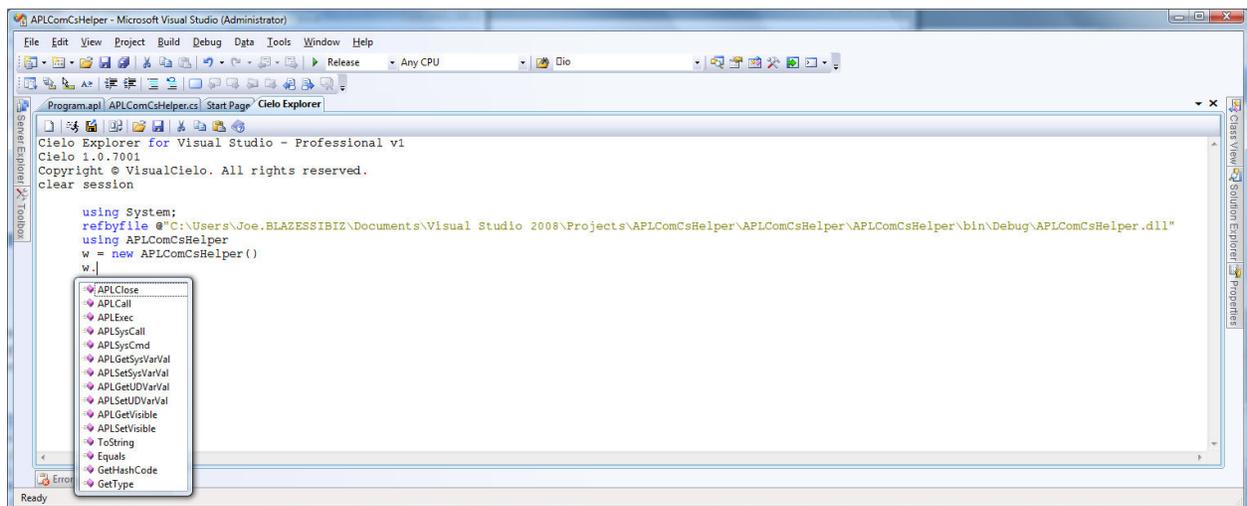
Provided below are examples using the “APLComCsHelper.dll” class library in the Cielo Explorer.

Notice how the refbyfile @”...” path points to the location of the “APLComCsHelper.dll” in the debugged solution. This path will vary for each programmer’s machine. As an alternative, the Cielo Explorer “Import Assembly” command button can be used to browse to the “APLComCsHelper.dll”. The “APLComCsHelper.dll” makes it easy to use APL+Win as a COM object in the Cielo Explorer.

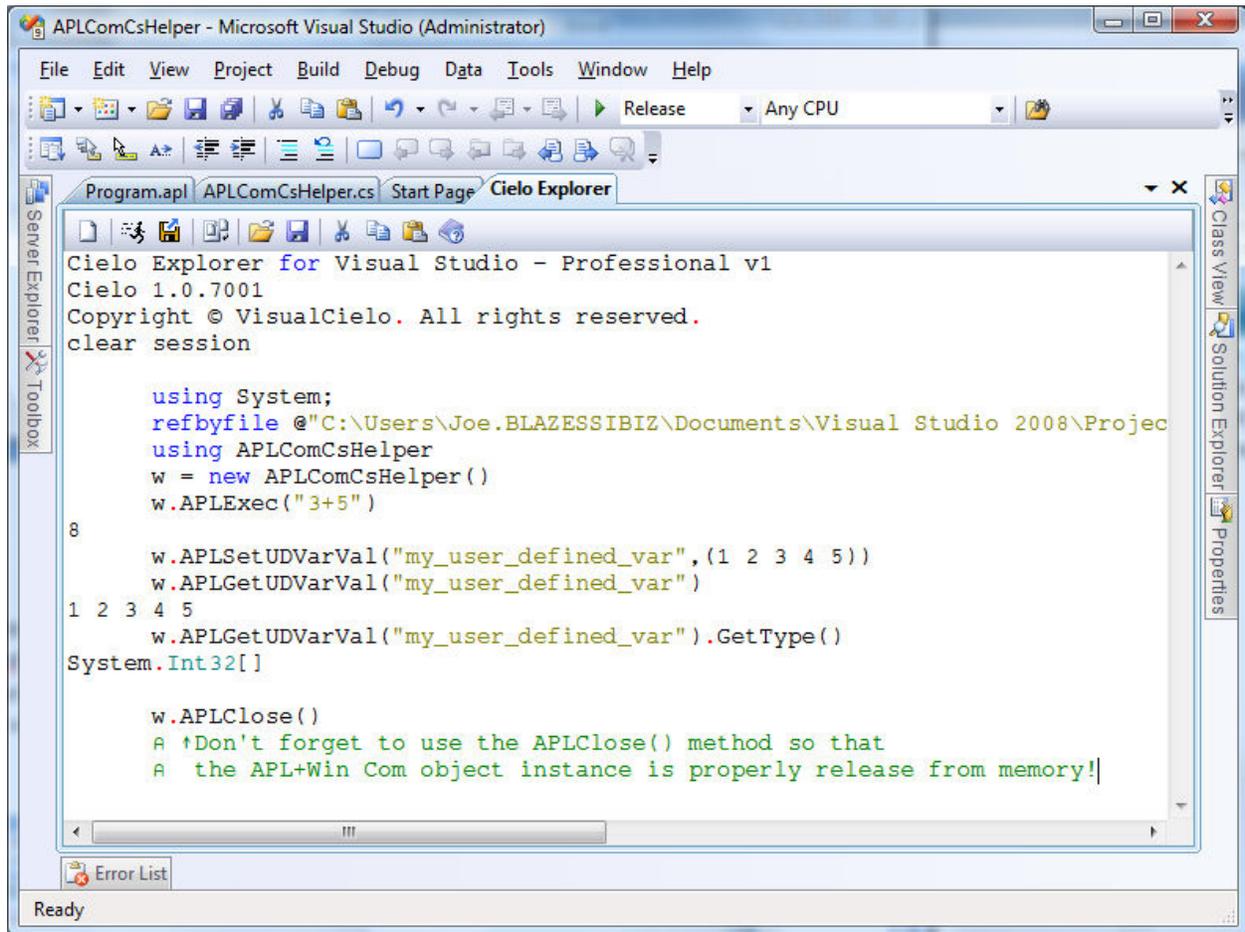
Note that the legacy `□wi` implementation in VisualAPL cannot support the creation of instances of COM objects. This is because the methodology of accessing COM objects in .Net requires an “interop” which is automatically created with a COM objects type library is reference in a Visual Studio 2008 project.

Microsoft Visual Studio 2008 Intellisense displays the methods of provided by the APLComCsHelper class. These methods correspond to the methods and properties of the APL+Win COM object.

(Use the Adobe Reader magnifier tool to view this detail in the screen capture.)



The remainder of the Cielo Explorer session is provided below. Observe how data can be transferred between APL+Win and VisualAPL using this "APLComCsHelper.dll":

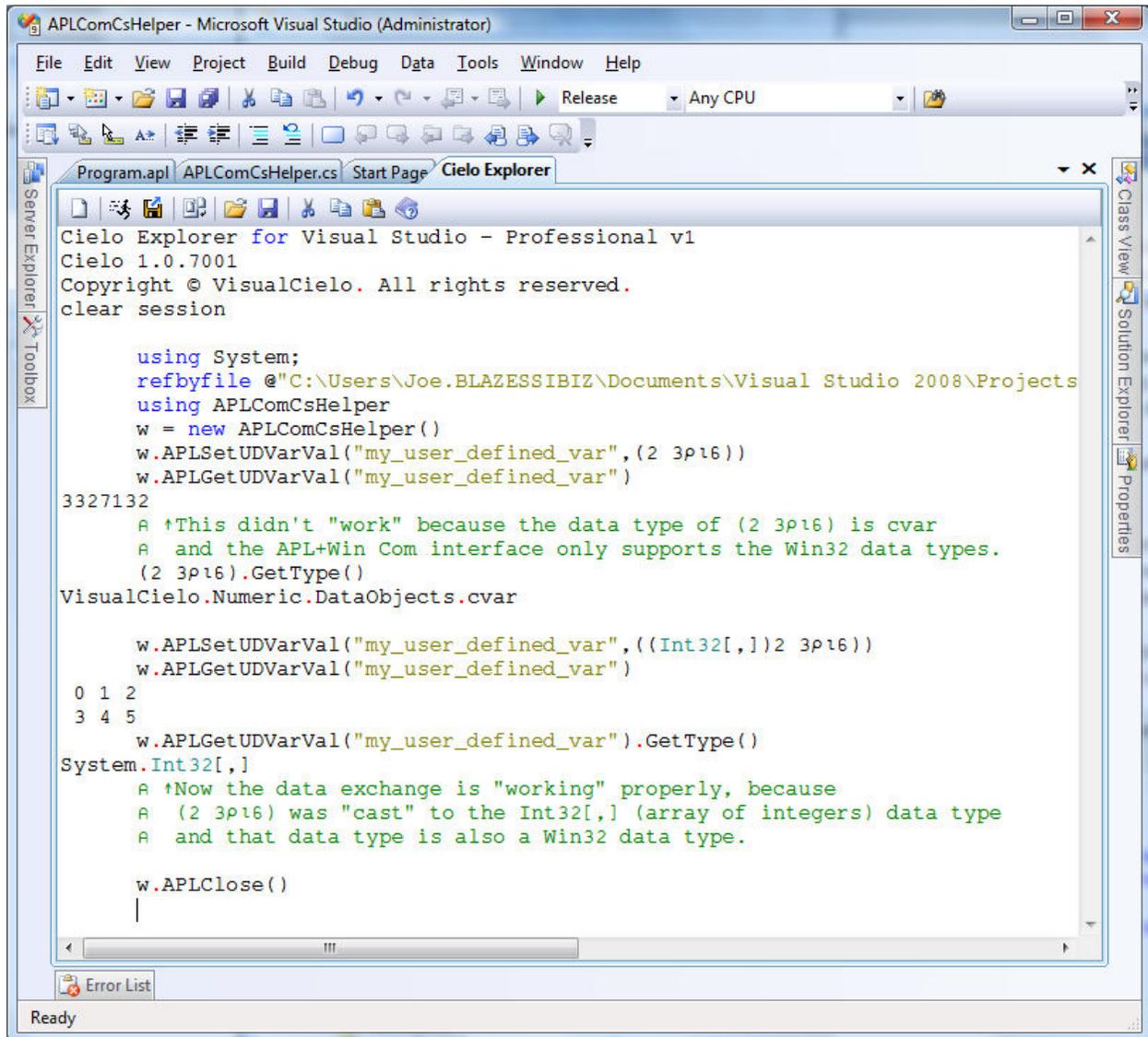


```
APLComCsHelper - Microsoft Visual Studio (Administrator)
File Edit View Project Build Debug Data Tools Window Help
Release Any CPU
Program.apl APLComCsHelper.cs Start Page Cielo Explorer
Cielo Explorer for Visual Studio - Professional v1
Cielo 1.0.7001
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clear session

using System;
refbyfile @"C:\Users\Joe.BLAZESSIBIZ\Documents\Visual Studio 2008\Projec
using APLComCsHelper
w = new APLComCsHelper()
w.APExec("3+5")
8
w.APLSetUDVarVal("my_user_defined_var", (1 2 3 4 5))
w.APLGetUDVarVal("my_user_defined_var")
1 2 3 4 5
w.APLGetUDVarVal("my_user_defined_var").GetType()
System.Int32[]

w.APLClose()
A ↑Don't forget to use the APLClose() method so that
A the APL+Win Com object instance is properly release from memory!
```

When exchanging data between .Net and the Win32-based COM object, the data type of the data must be carefully configured. Here is an numeric array example:



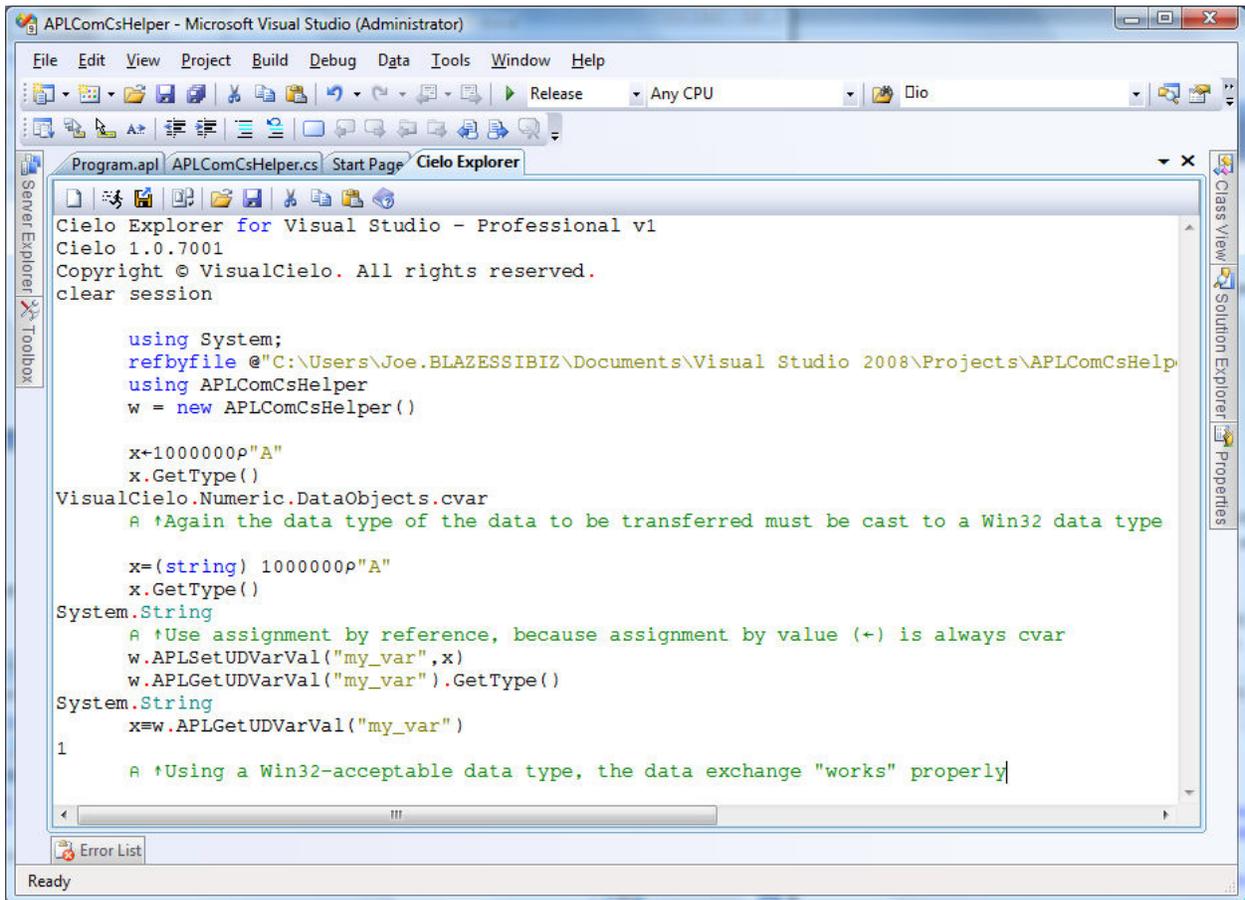
```
APLComCsHelper - Microsoft Visual Studio (Administrator)
File Edit View Project Build Debug Data Tools Window Help
Release Any CPU
Program.apl APLComCsHelper.cs Start Page Cielo Explorer
Cielo Explorer for Visual Studio - Professional v1
Cielo 1.0.7001
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clear session

using System;
refbyfile @"C:\Users\Joe.BLAZESSIBIZ\Documents\Visual Studio 2008\Projects
using APLComCsHelper
w = new APLComCsHelper()
w.APLSetUDVarVal("my_user_defined_var", (2 3p16))
w.APLGetUDVarVal("my_user_defined_var")
3327132
A ↑This didn't "work" because the data type of (2 3p16) is cvar
A and the APL+Win Com interface only supports the Win32 data types.
(2 3p16).GetType()
VisualCielo.Numeric.DataObjects.cvar

w.APLSetUDVarVal("my_user_defined_var", ((Int32[,])2 3p16))
w.APLGetUDVarVal("my_user_defined_var")
0 1 2
3 4 5
w.APLGetUDVarVal("my_user_defined_var").GetType()
System.Int32[,]
A ↑Now the data exchange is "working" properly, because
A (2 3p16) was "cast" to the Int32[,] (array of integers) data type
A and that data type is also a Win32 data type.

w.APLClose()
|
Error List
Ready
```

Here is another data exchange example using the string data type:



The screenshot shows the Microsoft Visual Studio (Administrator) interface. The main window displays the Cielo Explorer for Visual Studio - Professional v1. The code in the editor is as follows:

```
Cielo Explorer for Visual Studio - Professional v1
Cielo 1.0.7001
Copyright © VisualCielo. All rights reserved.
clear session

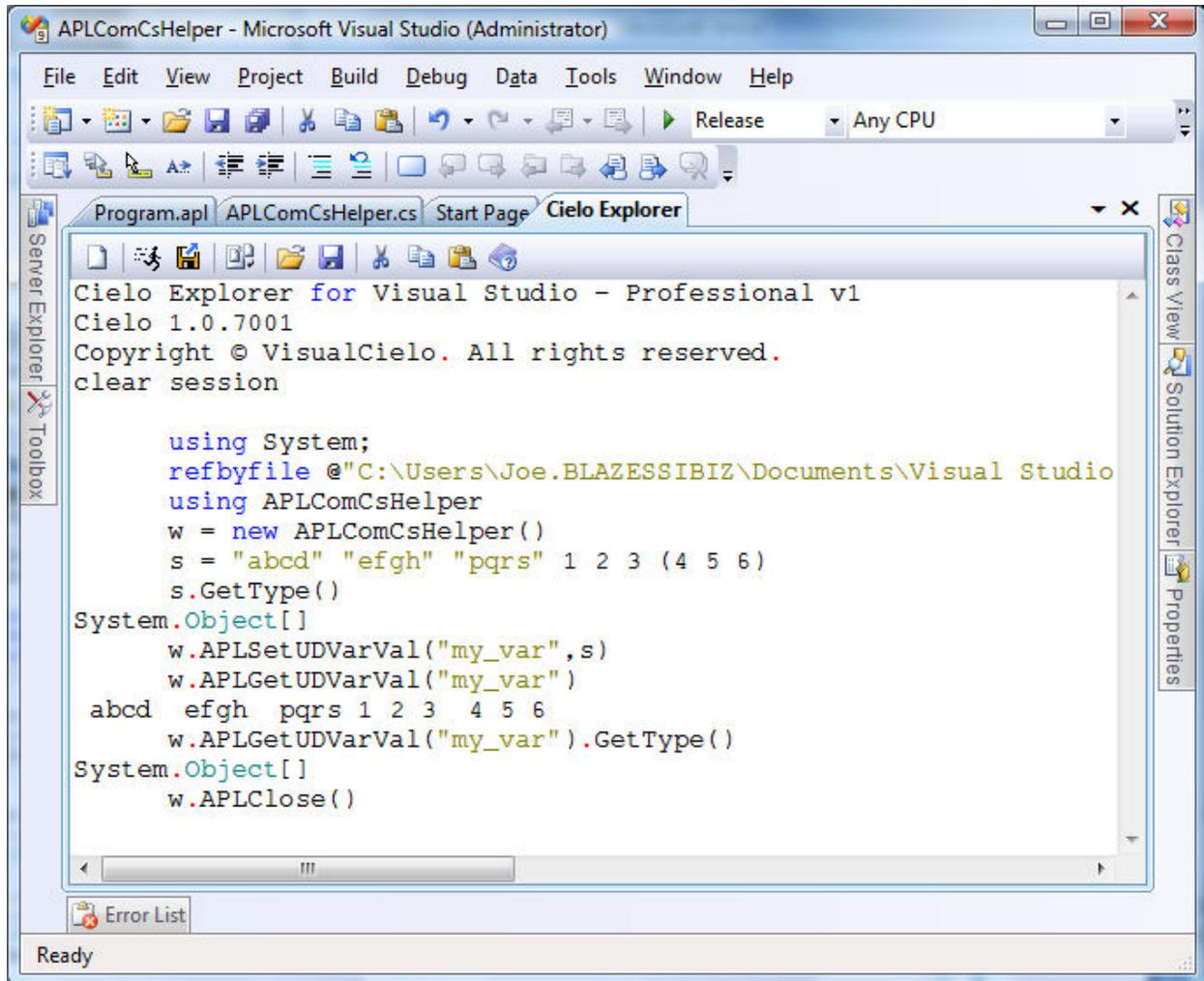
using System;
refbyfile @"C:\Users\Joe.BLAZESSIBIZ\Documents\Visual Studio 2008\Projects\APLComCsHelp
using APLComCsHelper
w = new APLComCsHelper()

x=1000000ρ"A
x.GetType()
VisualCielo.Numeric.DataObjects.cvar
A †Again the data type of the data to be transferred must be cast to a Win32 data type

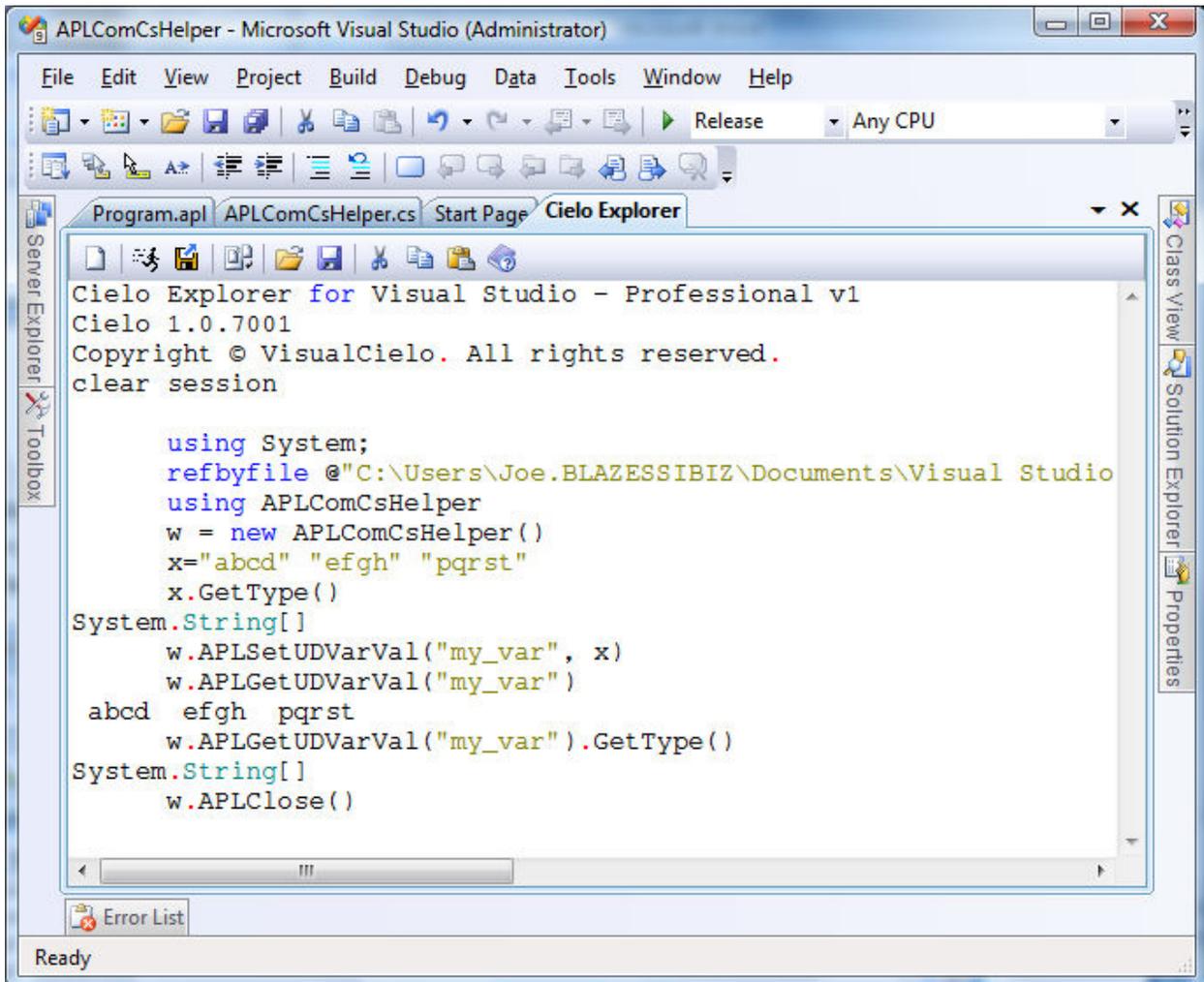
x=(string) 1000000ρ"A
x.GetType()
System.String
A †Use assignment by reference, because assignment by value (+) is always cvar
w.APLSetUDVarVal("my_var",x)
w.APLGetUDVarVal("my_var").GetType()
System.String
x=w.APLGetUDVarVal("my_var")
1
A †Using a Win32-acceptable data type, the data exchange "works" properly
```

The status bar at the bottom of the window shows "Ready".

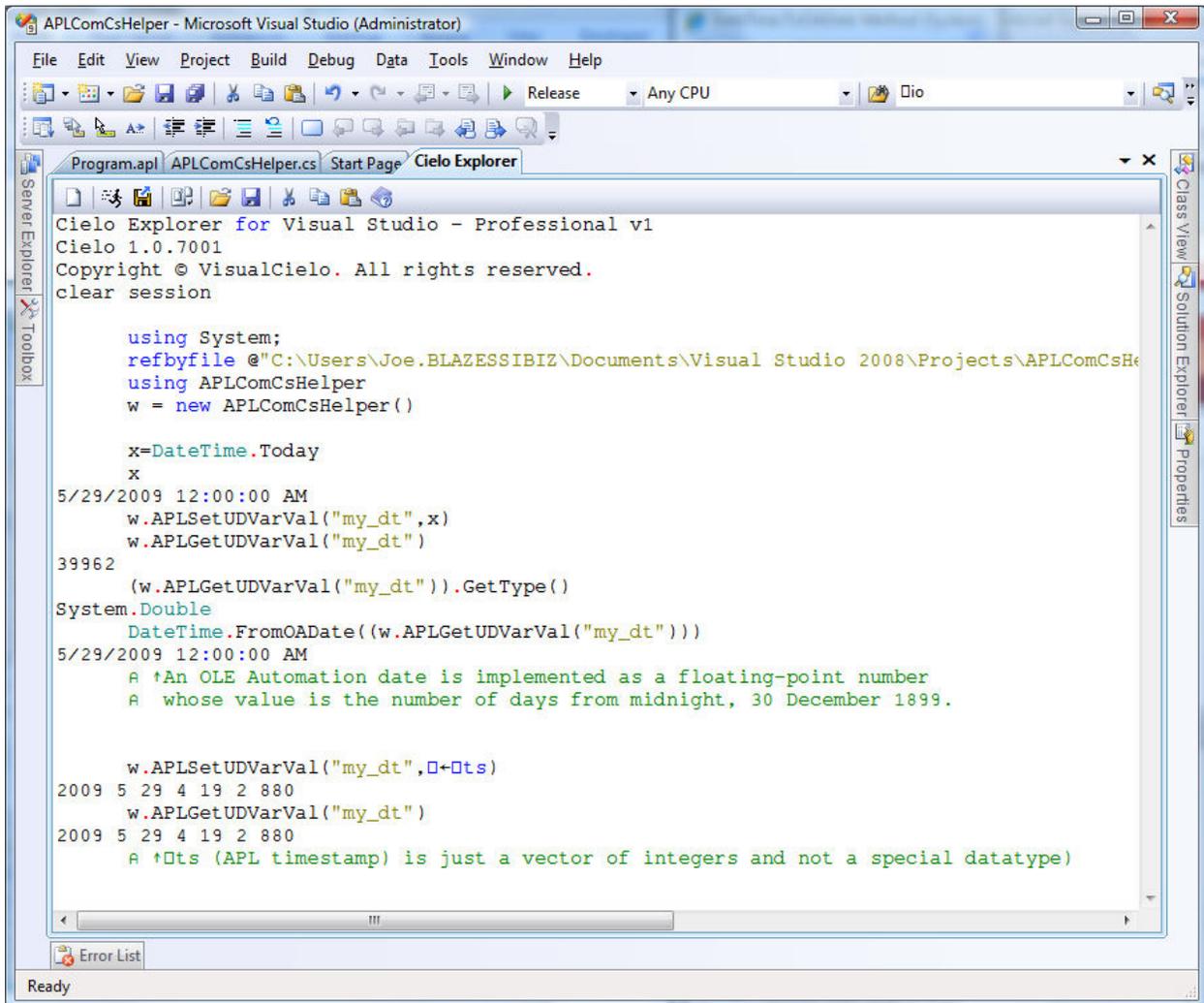
Here is a data exchange example using a mixed data type array. Notice the use of the assignment by reference (=), because using the assignment by value (-) always results in a cvar data type, which is not a Win32 data type.



Here is a data exchange example using a string[] data type:



The DateTime data type although named the same in both .Net and Win32 requires careful handling:



```
APLComCsHelper - Microsoft Visual Studio (Administrator)
File Edit View Project Build Debug Data Tools Window Help
Release Any CPU Dio
Program.apl APLComCsHelper.cs Start Page Cielo Explorer
Server Explorer
Toolbox
Class View
Solution Explorer
Properties

Cielo Explorer for Visual Studio - Professional v1
Cielo 1.0.7001
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clear session

using System;
refbyfile @"C:\Users\Joe.BLAZESEBIZ\Documents\Visual Studio 2008\Projects\APLComCsHe
using APLComCsHelper
w = new APLComCsHelper()

x=DateTime.Today
x
5/29/2009 12:00:00 AM
w.APLSetUDVarVal("my_dt",x)
w.APLGetUDVarVal("my_dt")
39962
(w.APLGetUDVarVal("my_dt")).GetType()
System.Double
DateTime.FromOADate((w.APLGetUDVarVal("my_dt")))
5/29/2009 12:00:00 AM
A †An OLE Automation date is implemented as a floating-point number
A whose value is the number of days from midnight, 30 December 1899.

w.APLSetUDVarVal("my_dt",□+Dts)
2009 5 29 4 19 2 880
w.APLGetUDVarVal("my_dt")
2009 5 29 4 19 2 880
A †Dts (APL timestamp) is just a vector of integers and not a special datatype
```

Error List

Ready

Here is an example of data exchange using a 2-dimensional array of strings:

```
APLComCsHelper - Microsoft Visual Studio (Administrator)
File Edit View Project Build Debug Data Tools Window Help
Release Any CPU
Program.apl APLComCsHelper.cs Start Page Cielo Explorer
Cielo Explorer for Visual Studio - Professional v1
Cielo 1.0.7001
Copyright © VisualCielo. All rights reserved.
clear session

using System;
refbyfile @"C:\Users\Joe.BLAZESEBIZ\Documents\Visual Studio 2008\Projects\APLComCs
using APLComCsHelper
w = new APLComCsHelper()

x=new string[,]{"abc","def","ghi","jkl","mno","pqr"}
x
abc
def
ghi
jkl
mno
pqr
x.GetType()
System.String[,]
w.APLSetUDVarVal("my_var",x)
w.APLGetUDVarVal("my_var")
abc
def
ghi
jkl
mno
pqr
w.APLGetUDVarVal("my_var").GetType()
System.String[,]
px
6 1

x=2 3px
x
abc def ghi
jkl mno pqr
x.GetType()
VisualCielo.Numeric.DataObjects.cvar
x=(string[,])x
x.GetType()
System.String[,]
w.APLSetUDVarVal("my_var",x)
w.APLGetUDVarVal("my_var")
abc def ghi
jkl mno pqr
|
Error List
Ready
```

Here is an example of a large string of 50,000,000 'characters':

