Acop.Net

The best ACOP there's ever been …

ACOP.NET Training

- Disclaimer(s) :
  - We’re making this up as we go along …
  - You are all ‘pioneers’ and will …
    - probably ‘discover things’
    - have ideas for improvements
    - and other wishes

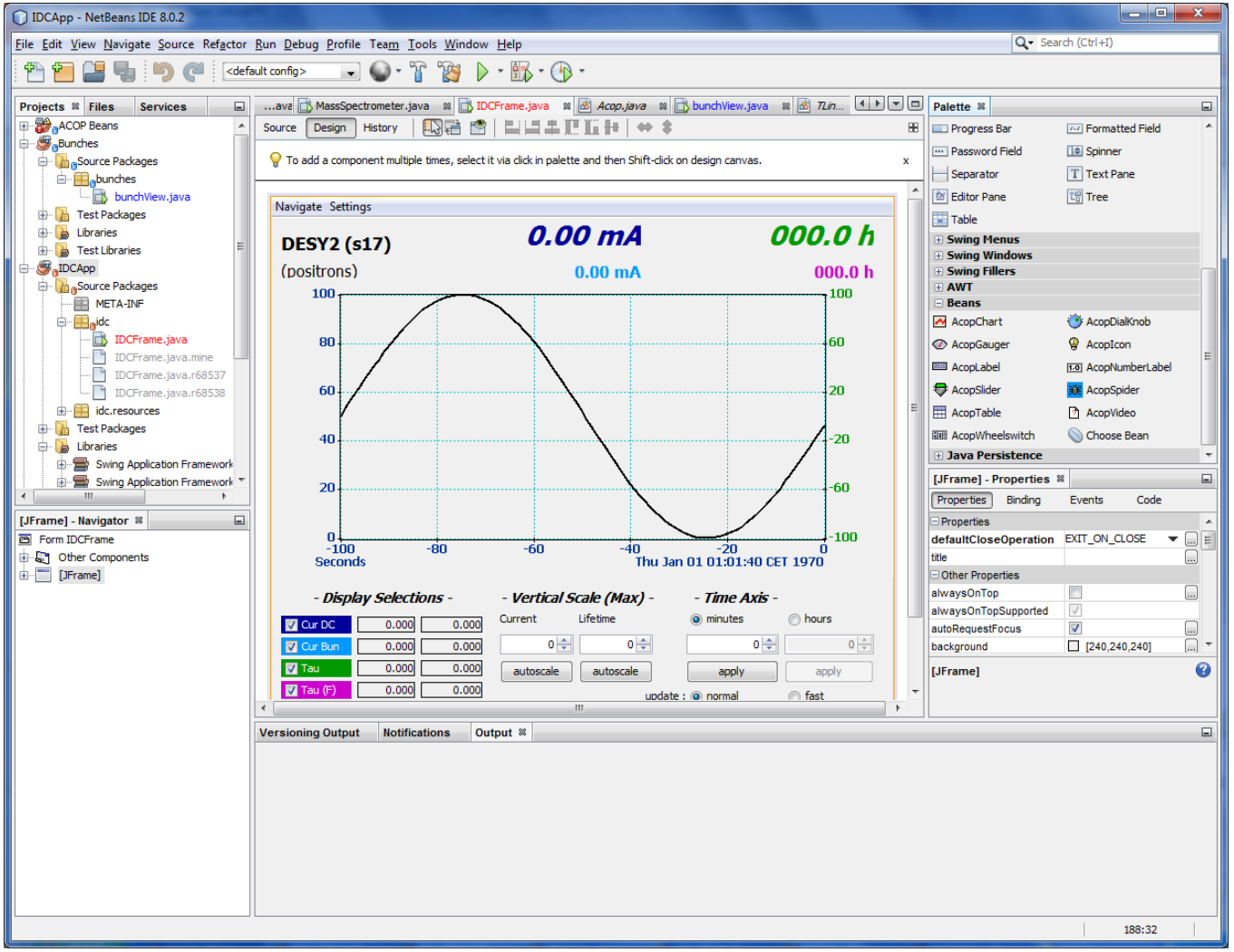
ACOP

- **ACOP**
  - (**A**dvanced **C**omponent **O**riented **P**rogramming)
- Acop *ActiveX* since 1997
- Acop *java* since 2002
- Acopbeans (*java*) since 2007
- Acop **.NET** chart since 2014

- Now : large variety of Acop **.NET**

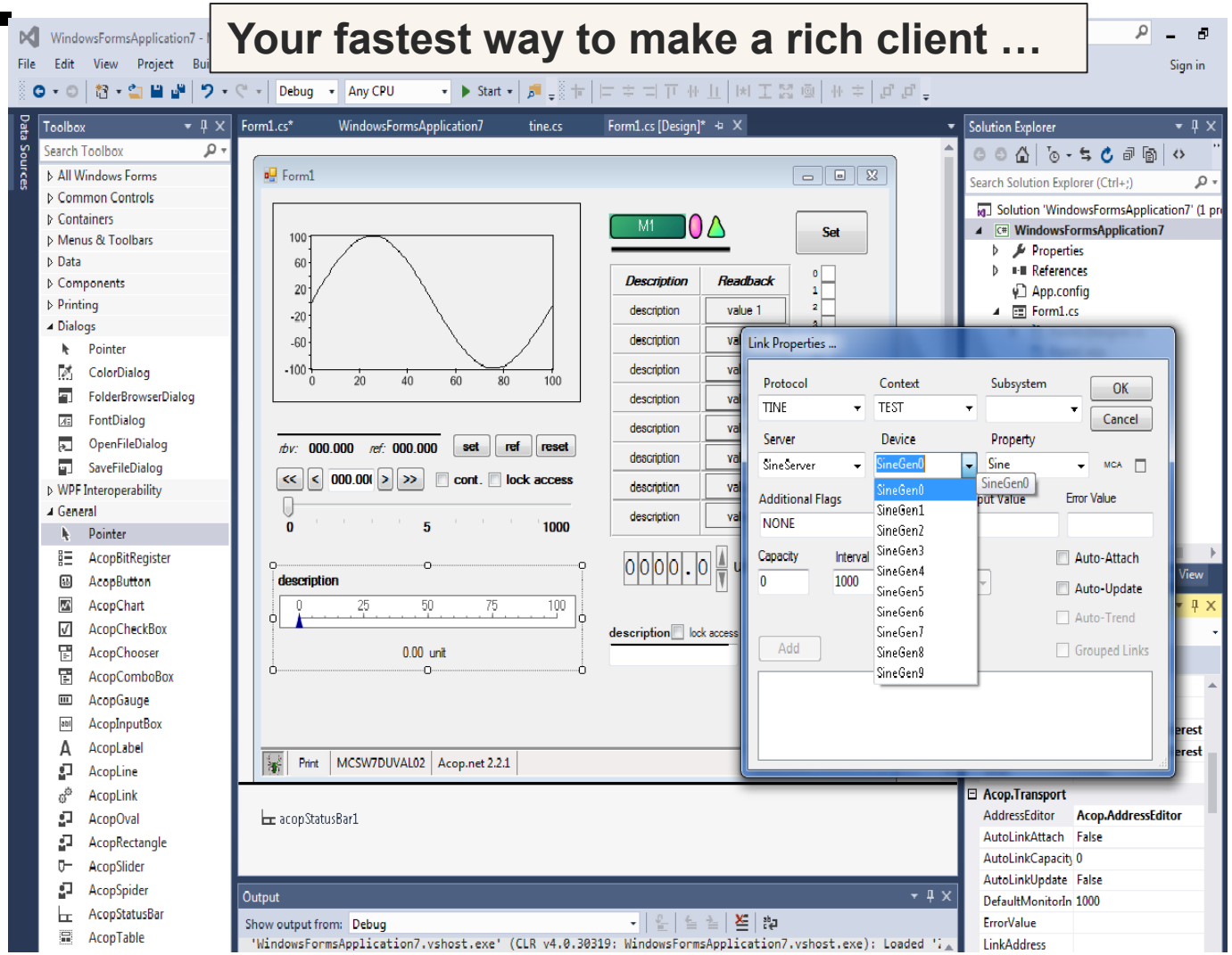
  smart components …

ACOP beans (java) …



Visual Studio

Your fastest way to make a rich client …

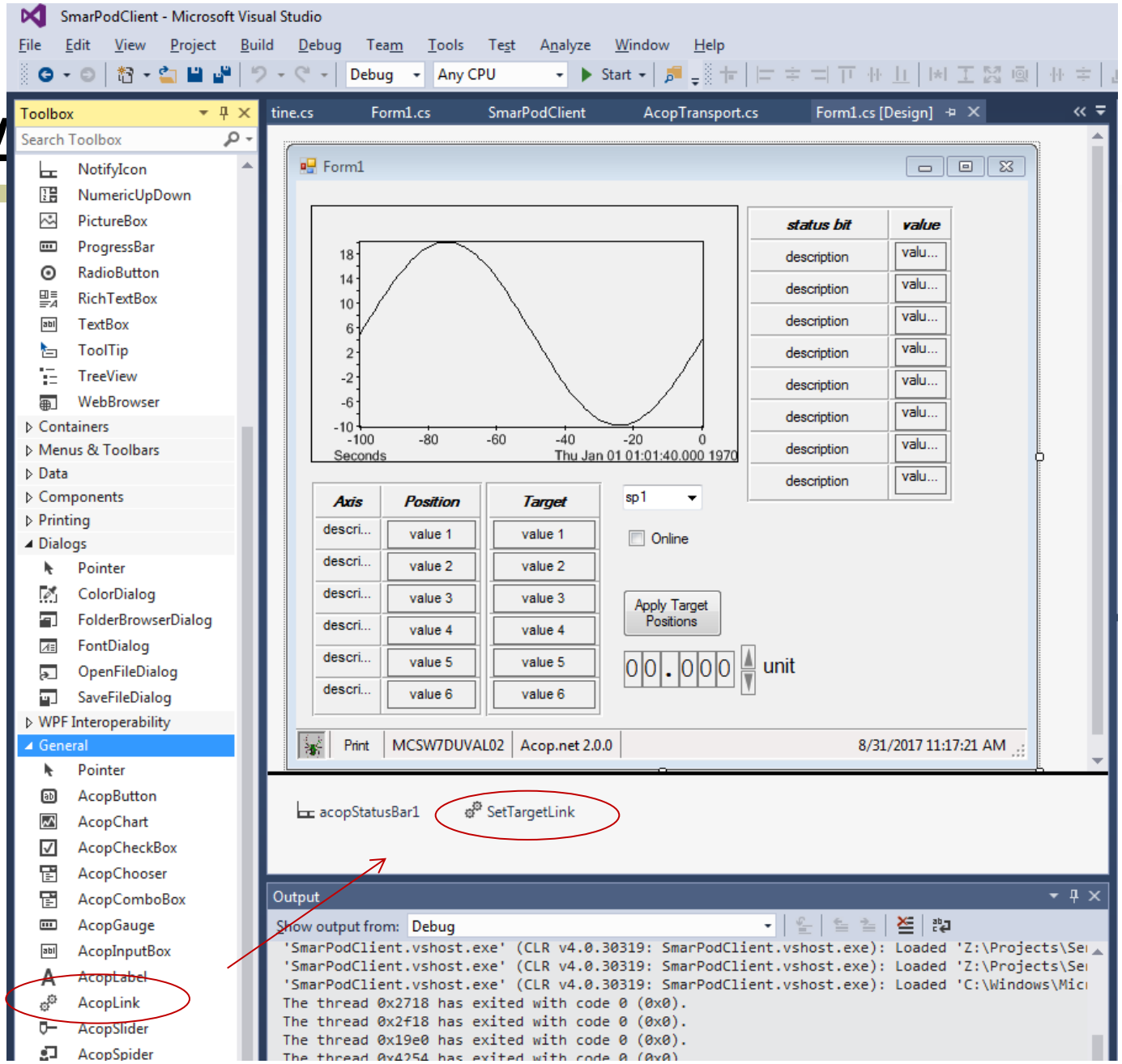


ACOP

- RAD tool for rich clients
  - **.NET**: you have your choice of many high level languages
    - C#, VB, C++, …
  - Can also *configure* simple panel-style applications …
    - and program later when you need to …
    - in your favorite language …
  - ACOP Chart already offers FFT, Gaussian fits, etc. but …
    - Use (e.g.) Math.NET for higher level mathematics (matrix inversion, etc.)

ACOP

- For those who remember the original ‘chart’ …
  - the .NET chart basically has the same features and interface
    - *with many improvements …*
  - If you’re programming and you ‘*just want a link to something*’
    - **don’t** use a chart and make it invisible !
    - use the ‘AcopLink’ component !


SmarPodClient - Microsoft Visual Studio
File Edit View Project Build Debug Team Tools Test Analyze Window Help
Debug
Any CPU
Start
Toolbox
Search Toolbox
NotifyIcon
NumericUpDown
PictureBox
ProgressBar
RadioButton
RichTextBox
TextBox
ToolTip
TreeView
WebBrowser
Containers
Menus & Toolbars
Data
Components
Printing
Dialogs
Pointer
ColorDialog
FolderBrowserDialog
FontDialog
OpenFileDialog
SaveFileDialog
WPF Interoperability
General
Pointer
AcopButton
AcopChart
AcopCheckBox
AcopChooser
AcopComboBox
AcopGauge
AcopInputBox
AcopLabel
AcopLink
AcopSlider
AcopSpider
tine.cs
Form1.cs
SmarPodClient
AcopTransport.cs
Form1.cs [Design]
Form1
18
14
10
6
2
-2
-6
-10
-100
-80
-60
-40
-20
0
Seconds
Thu Jan 01 01:01:40.000 1970
status bit
value
description
valu...
Axis
Position
Target
descri...
value 1
value 2
value 3
value 4
value 5
value 6
sp1
Online
Apply Target Positions
00.000
unit
Print
MCSW7DUVAL02
Acop.net 2.0.0
8/31/2017 11:17:21 AM
acopStatusBar1
SetTargetLink
Output
Show output from: Debug
'SmarPodClient.vshost.exe' (CLR v4.0.30319: SmarPodClient.vshost.exe): Loaded 'Z:\Projects\Se
'SmarPodClient.vshost.exe' (CLR v4.0.30319: SmarPodClient.vshost.exe): Loaded 'Z:\Projects\Se
'SmarPodClient.vshost.exe' (CLR v4.0.30319: SmarPodClient.vshost.exe): Loaded 'C:\Windows\Mic
The thread 0x2718 has exited with code 0 (0x0).
The thread 0x2f18 has exited with code 0 (0x0).
The thread 0x19e0 has exited with code 0 (0x0).

ACOP

- Notes:
  - Your application is NOT an XML file.
    - it's a .NET executable!
    - you have a .sln and code modules (even if you didn't write them).
    - you can run your application with mono on Linux and Mac.

Acop.NET

- Things to remember:
  - Visual Studio is itself a 32-bit application.
    - *most of our Windows hosts are 64-bit !*
  - The TINE interface uses interoperability to the native libraries.
    - *specifically*: **tinemt**
      - Windows: *tinemt.dll*
      - Linux: *libtinemt.so*
      - Mac: *libtinemt.dylib*

Acop.NET

- Things to remember:
  - Visual Studio is by far the easiest and fastest way to make applications
    - but you can use mono developer on Linux or Mac.
  - Get VS 2015 community edition for free
    - S:\services\Software\Visual Studio\Visual Studio 2015\Community-U3\
      - => vs_community.exe
  - Install the tine windows package
    - http://tine.desy.de -> downloads -> Windows Setup Installer -> Daily Build
    - http://adweb.desy.de/mcs/tine/TineArchive/setup.exe
  - Make life comfortable with templates …

Acop.NET

- Example 1
  - AcopLabel: /HELGOLAND/GlobalsCollector/keyword MessageText
  - AcopChart: /HELGOLAND/Idc/Buffer-0 I
    - AutoTrend = true
    - PlottedBarLinesFilled = fill_below
    - LeadingEdgeGap = 1
  - AcopTable:
    - /HELGOLAND/Undulators/PU01a Gap
    - Capacity = 27
    - Add another column with StatusString

Acop.NET

- Example 2
  - Sine Server
    - Chart with 1 Sine Curve
    - Chart with multiple Sine Curves
    - Colors
    - Legend Table
      - Amplitude
      - Frequency
      - …
    - Slider
    - Wheel Switch
    - Input Box
    - Chooser

Acop.NET

- Some coding patterns …

ACOP.NET patterns …

- *Single Update*
  - *C#*

```
private void button1_Click_1(object sender, EventArgs e)
{
  acopChart1.SingleUpdate();
}
```

  - VB

```
Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
  AcopChart1.SingleUpdate()
End Sub
```

ACOP.NET patterns …

- *GetDrawnData*

C# :

```
double[][] v = new double[5][];
1 reference
private void acopChart1_acopLinkUpdate(object sender, Acop.Link lnk)
{
  Acop.Link[] lnks = lnk.GetTransportLinkTable();
  int id;
  for (int i=0; i<lnks.Length; i++)
  {
    id = lnks[i].GetDisplayId();
    v[i] = acopChart1.GetDrawnYData(id);
  }
}
```

VB :

```
Dim v(5)() As Double
0 references
Private Sub chartUpdate(sender As Object, lnk As Acop.Link) Handles AcopChart1.acopLinkUpdate
  Dim lnks As Acop.Link()
  lnks = lnk.GetTransportLinkTable()
  Dim i As Integer
  Dim id As Integer
  For i = 0 To lnks.Length - 1
    id = lnks(i).GetDisplayId()
    v(i) = AcopChart1.GetDrawnYData(id)
  Next
End Sub
```

ACOP.NET patterns …

- MouseMove etc.

C# :

```
private void sineChart_acopMsMove(object sender, Acop.AcopChartUtil.AcopEvent e)
{
  int i = e.GetArrayIndex();
  if (v[0] != null) acopTable7.SetTableValue(1, v[0][i].ToString());
  if (v[1] != null) acopTable7.SetTableValue(2, v[1][i].ToString());
  if (v[2] != null) acopTable7.SetTableValue(3, v[2][i].ToString());
  if (v[3] != null) acopTable7.SetTableValue(4, v[3][i].ToString());
}
```

VB :

```
Private Sub chartMouseMove(sender As Object, e As Acop.AcopChartUtil.AcopEvent) Handles AcopChart1
  Dim i As Integer
  i = e.GetArrayIndex()
  If Not v(0) Is Nothing Then AcopTable4.SetTableValue(1, v(0)(i).ToString())
  If Not v(1) Is Nothing Then AcopTable4.SetTableValue(2, v(1)(i).ToString())
  If Not v(2) Is Nothing Then AcopTable4.SetTableValue(3, v(2)(i).ToString())
  If Not v(3) Is Nothing Then AcopTable4.SetTableValue(4, v(3)(i).ToString())

End Sub
```

ACOP.NET patterns …

- Other Forms …

C# :

```
private void button1_Click_1(object sender, EventArgs e)
{
  Form2 f = new Form2();
  f.Show();
```

VB :

```
Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
  Dim f As Form2
  Dim id As Integer
  f = Form2
  Form2.Show()
```

ACOP.NET patterns …

- MouseMove etc.

C# :

```
String[] devNames = null;
1 reference
private void acopChart1_acopMsMove(object sender, Acop.AcopChartUtil.AcopEvent e)
{
  if (devNames == null)
  {
    devNames = acopChart1.GetLinkOutputChannelNames();
  }
  acopChart1.LinkDevice = devNames[e.GetArrayIndex()];
```

VB :

```
Dim AmpNames() As String
0 references
Private Sub AcopChart2_acopClicked(sender As Object, e As Acop.AcopChartUtil.AcopEvent) Handles Ac
  If AmpNames Is Nothing Then
    AmpNames = AcopChart2.GetLinkOutputChannelNames()
  End If
  Dim s As String
  s = "clicked " + AmpNames(e.GetArrayIndex())
  Label1.Text = s
```

ACOP.NET patterns …

VB :

Doing it yourself …

```
Dim sine0vals(1023) As Single
Dim sine1vals(1023) As Single
Dim sine2vals(1023) As Single
Dim sine3vals(1023) As Single
Dim sine4vals(1023) As Single

Private Sub Button9_Click(sender As Object, e As EventArgs) Handles Button9.Click
  Acop5.LinkContext = "TEST"
  Acop5.LinkServer = "SineServer"
  Acop5.LinkDevice = "SineGen0"
  Acop5.LinkProperty = "Sine"
  Acop5.LinkGrouped = True
  Acop5.FrameCaption = "The first 5 sine curves !"
  Acop5.XAxisLabel = "time (ms)"
  Acop5.YAxisLabel = "amplitude (v)"
  Acop5.Attach(sine0vals, Nothing, 0, 1000, Nothing)

  Acop5.LinkDevice = "SineGen1"
  Acop5.Attach(sine1vals, Nothing, 0, 1000, Nothing)

  Acop5.LinkDevice = "SineGen2"
  Acop5.Attach(sine2vals, Nothing, 0, 1000, Nothing)

  Acop5.LinkDevice = "SineGen3"
  Acop5.Attach(sine3vals, Nothing, 0, 1000, Nothing)

  Acop5.LinkDevice = "SineGen4"
  Acop5.Attach(sine4vals, Nothing, 0, 1000, Nothing)

End Sub
```

ACOP.NET patterns …

- *Callback Delegates C#*

```
2 references
private void acopChart1_acopLinkUpdate(object sender, Acop.Link lnk)
{
  // ... update stuff ...
}
```

```
delegate void acopChart1UpdateDelegate(object sender, Acop.Link lnk);
2 references
private void acopChart1_acopLinkUpdate(object sender, Acop.Link lnk)
{
  if (acopChart1.InvokeRequired)
  {
    Invoke(new acopChart1UpdateDelegate(acopChart1_acopLinkUpdate), sender, lnk);
    return;
  }
  // ... update stuff ...
}
```

ACOP.NET patterns …

- *Callback Delegates VB*

```
Private Sub AcopChart1_acopLinkUpdate(sender As Object, lnk As Acop.Link) Handles AcopChart1.acopLinkUpdate
    ' update stuff ...
End Sub
```

```
Delegate Sub AcopChart1UpdateDelegate(sender As Object, ByVal lnk As Acop.Link)
1 reference
Private Sub AcopChart1_acopLinkUpdate(sender As Object, lnk As Acop.Link) Handles AcopChart1.acopLinkUpdate
    If AcopChart1.InvokeRequired Then
        Invoke(New AcopChart1UpdateDelegate(AddressOf AcopChart1_acopLinkUpdate), sender, lnk)
        Exit Sub
    End If
    ' update stuff ...
End Sub
```

ACOP.NET patterns …

- Drawing shapes …
  - e.g. in the paint event:

```
private void Form1_Paint(object sender, PaintEventArgs e)
{
  Acop.AcopShapeUtils.DrawLine(this, Color.DarkBlue, 10, acopRectangle1, acopOval1, "line1");
}
```

  - then in the form´s mouse move/click event:

```
    private Boolean writeEmptyLine = false;
    1 reference
    private void Form1_MouseMove(object sender, MouseEventArgs e)
    {

      if (Acop.AcopShapeUtils.IsPointOnPath("line1",e.X, e.Y))
      {
        Console.WriteLine("hurray! the Mouse is over the path!");
        // do something a bit more interesting
        writeEmptyLine = true;
        return;
      }
      if (writeEmptyLine)
      {
        Console.WriteLine("Mouse is no longer over the path!");
        writeEmptyLine = false;
      }
    }
  }
```