



# TINE Release 4.0 News

(Sept 4, 2009: That was the month that was !)

“What a long, strange trip it’s been ....”

# [ Bug fixes & embellishments ... ]

## ■ VxWorks:

- Work-around (Motorola Boards)
  - Don't allow configuration file read-outs for "late" registered modules!
    - Potential deadlock between File Access (via RSH) and "full" socket buffer space on other sockets (server socket, globals socket).

# [ Bug fixes & embellishments ... ]

## ■ Java:

- New archive retrieval methods:  
`getArchivedData(...,boolean extendedRange)`
  - Adds 2\*ArchiveHeartbeat to each end of time range
- Check for 'exports.csv or fec.xml' in Equipment module constructor by default (was optional call).
  - Allows (additional) property registration via config file.
    - e.g. redirect local history call for "Temperature.HIST" to "/PETRA/HISTORY"

# [ Bug fixes & embellishments ... ]

- C Library:

- Allow optional compile switches:

- Dtine\_decorated\_constants

- DTINE\_DECORATED\_CONSTANTS

- re-#defines upper/lower case constants in header files to avoid 'collisions' with other packages

- e.g. STL has 'out\_of\_range' as does 'tine.h'

- tine.h: 'out\_of\_range' -> 'tdc\_out\_of\_range'

- e.g. WINDOWS has 'CF\_NULL', 'CF\_TEXT' as does 'tine.h'

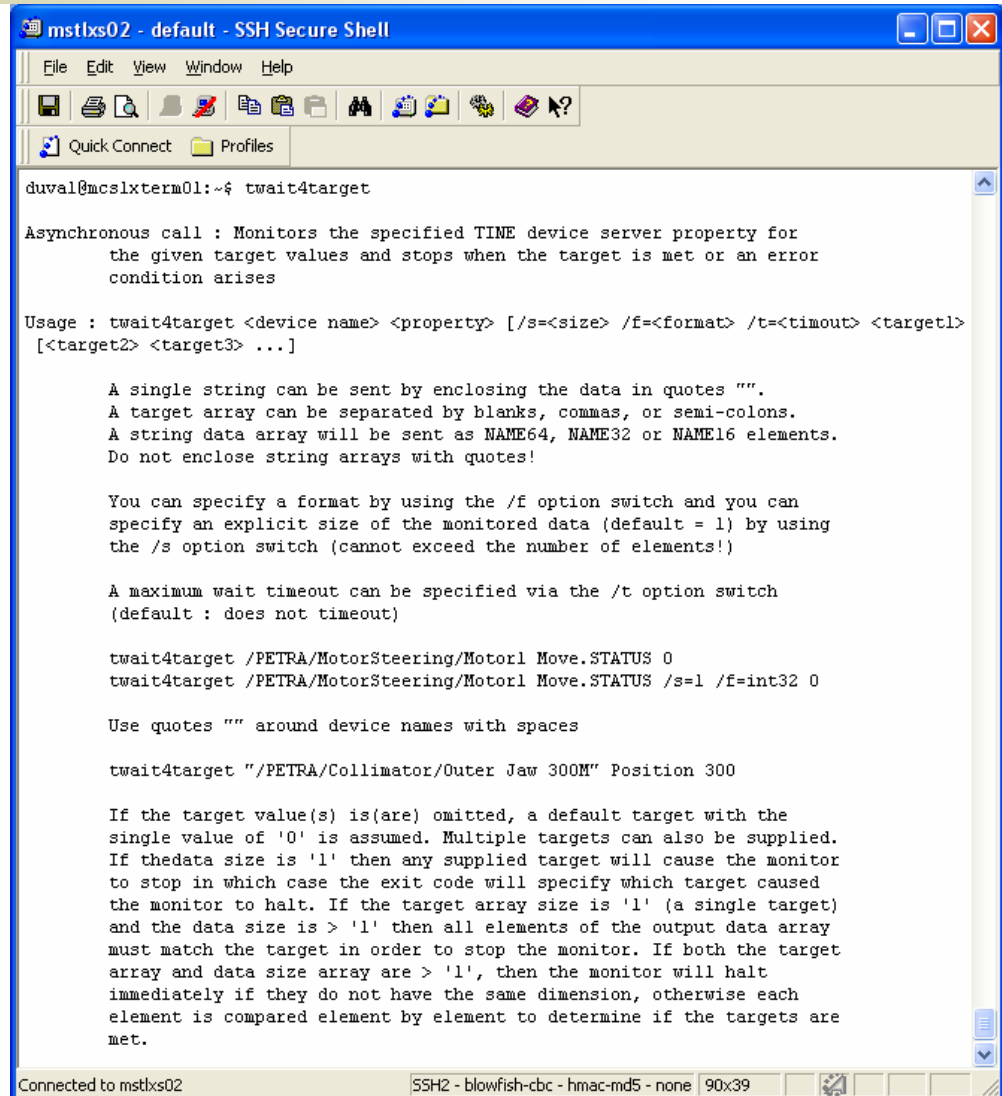
- tine.h: 'CF\_NULL' -> 'TDC\_CF\_NULL'

# [ Bug fixes & embellishments ... ]

- C Library:
  - UNIX builds: [tcyclcr.c added to libtinemt.so](#)
    - parallel to tine32.dll (i.e. tinemt.dll)
    - includes SystemSetCycleTimer() for use in .NET and python.
  - [SetSizeDeviceCapacity\(\)](#)
    - allows post-initialization increases of the registered device space
      - if devices are added at runtime and the registered capacity needs to increase (GENS needs this)
  - [SetSystemSchedulePropertyLazy\(\)](#) available for possible use of scheduling within ISRs where a 'quick' exit is required.
    - marks the property for scheduling for the next 'normal' pass of the scheduler (~Clock Tick)

# Bug fixes & embellishments ...

- Scripting: twait4target()



```
mstlxs02 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
duval@mcs1xterm01:~$ twait4target

Asynchronous call : Monitors the specified TIME device server property for
the given target values and stops when the target is met or an error
condition arises

Usage : twait4target <device name> <property> [/s=<size> /f=<format> /t=<timout> <target1>
[<target2> <target3> ...]

A single string can be sent by enclosing the data in quotes "".
A target array can be separated by blanks, commas, or semi-colons.
A string data array will be sent as NAME64, NAME32 or NAME16 elements.
Do not enclose string arrays with quotes!

You can specify a format by using the /f option switch and you can
specify an explicit size of the monitored data (default = 1) by using
the /s option switch (cannot exceed the number of elements!)

A maximum wait timeout can be specified via the /t option switch
(default : does not timeout)

twait4target /PETRA/MotorSteering/Motor1 Move.STATUS 0
twait4target /PETRA/MotorSteering/Motor1 Move.STATUS /s=1 /f=int32 0

Use quotes "" around device names with spaces

twait4target "/PETRA/Collimator/Outer Jaw 300M" Position 300

If the target value(s) is(are) omitted, a default target with the
single value of '0' is assumed. Multiple targets can also be supplied.
If thedata size is '1' then any supplied target will cause the monitor
to stop in which case the exit code will specify which target caused
the monitor to halt. If the target array size is '1' (a single target)
and the data size is > '1' then all elements of the output data array
must match the target in order to stop the monitor. If both the target
array and data size array are > '1', then the monitor will halt
immediately if they do not have the same dimension, otherwise each
element is compared element by element to determine if the targets are
met.

Connected to mstlxs02 SSH2 - blowfish-cbc - hmac-md5 - none 90x39
```

# [ Bug fixes & embellishments ... ]

- Release 4.0.11
  - Next will be 4.1.0
  - Remaining: including non-fixed-length format types (CF\_STRING, CF\_IMAGE, CF\_SPECTRUM) in structures and archive.
- But, as of this release:
  - **Enforced Multi-Channel Array acquisition is in play !**
    - Registered Multi-Channel Array properties require contracts to access the entire multi-channel array

# [ Bug fixes & embellishments ... ]

- How it works:
  - Client asks for 1 element of multi-channel array
  - Handshaking takes place:
    - Server informs client of size of array and which index refers to the desired element.
  - Multiple links (e.g. get all 500 vacuum pumps individually) collapse to a single link, with minimal impact on the server.
  - What could go wrong?



# [ Bug fixes & embellishments ... ]

- What if the property is registered as a multi-channel array of length “1”?
- Handshaking:
  - Client asks for 1 element
  - Server says, “No ask for all of them”
  - Client asks for 1 element
  - Etc.
- Server-side bug repaired!
  - Handshaking only takes place if registered array length  $> 1$  !

# [ Bug fixes & embellishments ... ]

- MS-DOS

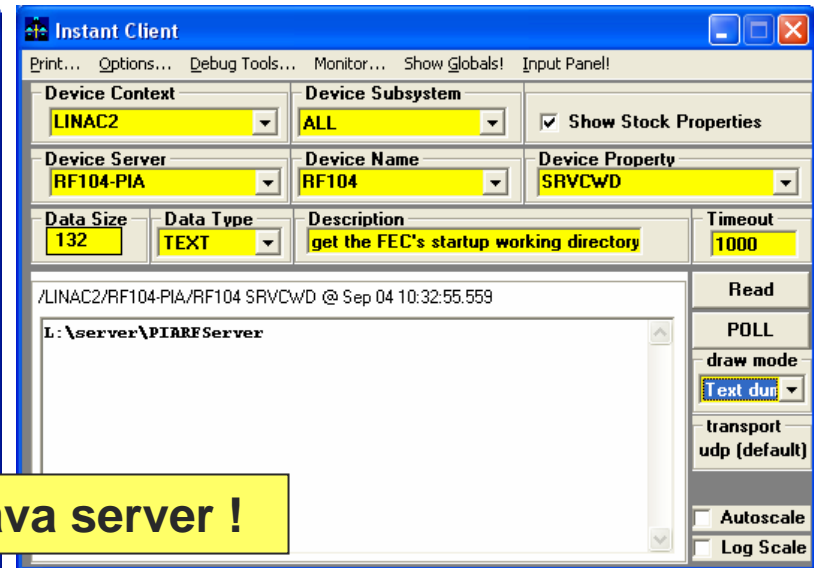
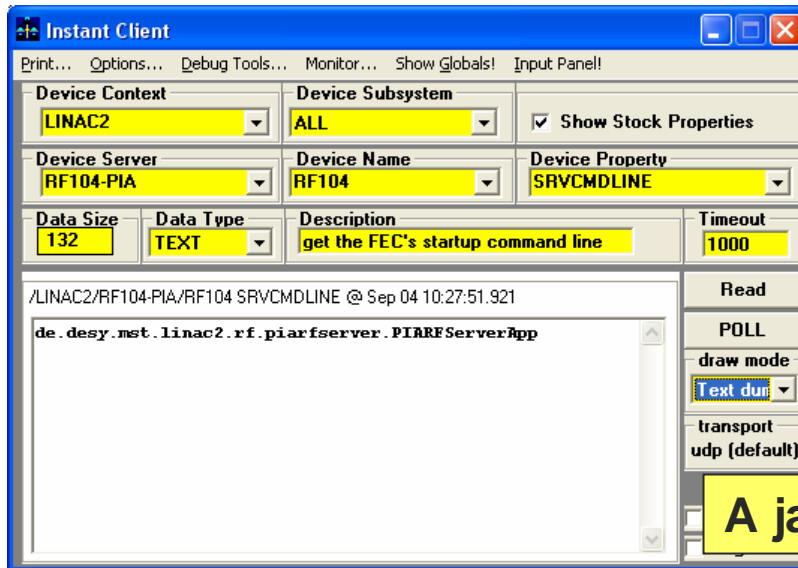
- Now compiles in Large Memory Model
- Uses compile switch
  - DSMALL\_TINE\_LIB
- Largely tests the consistency of a build with this compile switch.

# [ New Features (cmd line) ]

- Determining the **command line** and the **working directory** from the TINE library.
  - Straightforward in WINDOWS and UNIX
  - Difficult in Java
    - Can sometimes discover which class called Main.
    - How to determine the startup parameters and JVM switches ?
  - Difficult in VxWorks
    - Can discover the Task which launched SystemInit().

# New Features (cmd line)

- New Stock Properties
  - “SRVCMDLINE” (command line)
  - “SRVCWD” (current working directory)



A java server !

# [ New Features (cmd line) ]

The screenshot shows the 'Instant Client' window with the following configuration:

Device Context	LINAC2	Device Subsystem	ALL	<input checked="" type="checkbox"/> Show Stock Properties			
Device Server	RF104-PIA.CDI	Device Name	ESUAnode	Device Property	SRVCMDLINE		
Data Size	132	Data Type	TEXT	Description	full command line used to start the ser	Timeout	1000

Terminal output:

```
/LINAC2/RF104-PIA.CDI/ESUAnode SRVCMDLINE @ Sep 04 10:35:35.385  
L:\system32\CdiHdwSrv.exe /c=LINAC2 /p=40  
/d=L:\server\cdi\rf104 /n=RF104-PIA
```

The screenshot shows the 'Instant Client' window with the following configuration:

Device Context	LINAC2	Device Subsystem	ALL	<input checked="" type="checkbox"/> Show Stock Properties			
Device Server	RF104-PIA.CDI	Device Name	ESUAnode	Device Property	SRVCWD		
Data Size	132	Data Type	TEXT	Description	working directory in play when the ser	Timeout	1000

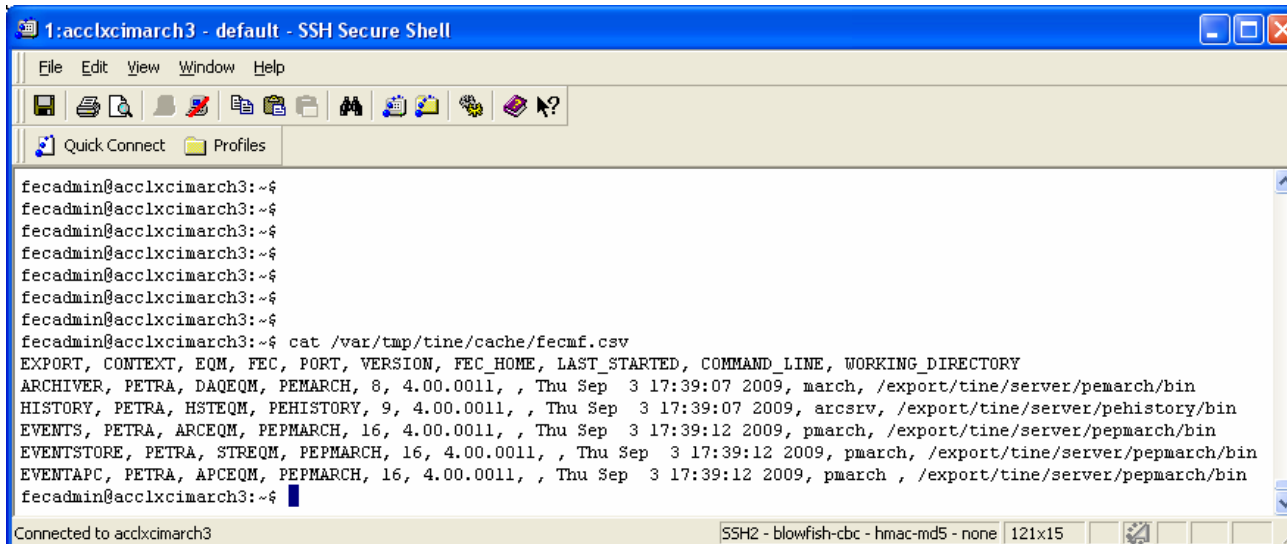
Terminal output:

```
/LINAC2/RF104-PIA.CDI/ESUAnode SRVCWD @ Sep 04 10:38:42.479  
L:\Server
```

**A Windows Server !**

# New Features (cmd line)

- New information found in the server manifest (fecmf.csv)
  - SystemDrive:\tine\cache\
    - /var/tmp/tine/cache/



```
1:acclxcimarch3 - default - SSH Secure Shell
File Edit View Window Help
Quick Connect Profiles
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$
fecadmin@acclxcimarch3:~$ cat /var/tmp/tine/cache/fecmf.csv
EXPORT, CONTEXT, EQM, FEC, PORT, VERSION, FEC_HOME, LAST_STARTED, COMMAND_LINE, WORKING_DIRECTORY
ARCHIVER, PETRA, DAQEQM, PEMARCH, 8, 4.00.0011, , Thu Sep  3 17:39:07 2009, march, /export/tine/server/pemarch/bin
HISTORY, PETRA, HSTEQM, PEHISTORY, 9, 4.00.0011, , Thu Sep  3 17:39:07 2009, arcsrv, /export/tine/server/pehistory/bin
EVENTS, PETRA, ARCEQM, PEPMARCH, 16, 4.00.0011, , Thu Sep  3 17:39:12 2009, pmarch, /export/tine/server/pepmarch/bin
EVENTSTORE, PETRA, STREQM, PEPMARCH, 16, 4.00.0011, , Thu Sep  3 17:39:12 2009, pmarch, /export/tine/server/pepmarch/bin
EVENTAPC, PETRA, APCEQM, PEPMARCH, 16, 4.00.0011, , Thu Sep  3 17:39:12 2009, pmarch, /export/tine/server/pepmarch/bin
fecadmin@acclxcimarch3:~$
Connected to acclxcimarch3          SSH2 - blowfish-cbc - hmac-md5 - none 121x15
```

# [ New Features (env) ]

- New Environment Variables

- **FEC\_LOCATION**

- e.g. set FEC\_LOCATION=Bldg 20 Rack 2B
- Supersedes input from config file or API
- If set should be valid for the location of anything running on the host !

- **<EQM>\_SUBSYSTEM**

- e.g. set GRAEQM\_SUBSYSTEM=VIDEO
- Supersedes input from config file or API

# Central Services: CSSPY

**Control System Spy (LINAC2)**

Navigate Options

User	Current Rights
PETRACON	has WRITE privileges!
HINSCH	has WRITE privileges!
DOCON	has WRITE privileges!
DESYCON	has WRITE privileges!
DESYDEV	has WRITE privileges!
WST	has WRITE privileges!
COMMONCON	has WRITE privileges!
MPSADMIN	has WRITE privileges!
LABUDDA	has WRITE privileges!
MKIRSM	has WRITE privileges!
DOOCSADM	has WRITE privileges!
PETRADEV	has WRITE privileges!
DUVAL	has WRITE privileges!
COMMONDEV	READ only
SYSTEM	has WRITE privileges!
WEBADMIN	READ only
BOESPFL	has WRITE privileges!
MVARUFB	has WRITE privileges!
APPLIC	has WRITE privileges!
SIDALH	has WRITE privileges!
MKKUSER1	has WRITE privileges!
JAHNA	READ only
DESY_DEVICE	has WRITE privileges!
CJAEKEL	has WRITE privileges!
TESCH	has WRITE privileges!
FSFHH	has WRITE privileges!
WALLA	has WRITE privileges!

LABUDDA is logged into:

GENS piFieldLinac2P piCentDeLIP  
LTG-SRV1 ACCXPL2DIAG.1  
I2chopsrv

LABUDDA is logged in on stations:

131.169.9.231 131.169.97.46  
131.169.153.41

LABUDDA has full control over:

LTG-SRV1 ACCXPL2DIAG.1  
I2chopsrv

User view

FEC view

**Control System Spy (LINAC2)**

Navigate Options

L2MARCH	L2HISTORY	L2TRC.1	L2STATSRV
L2GLOBALSRV	L2CASFEC	L2ALMSTATE	L2.MODUL
IELMINT.4	L2FECSTATSRV	L2lwegl.1	PIAIDC.1
PIAIAC.2	LTG-SRV1	PIAIMD.3	L2STRMIN.3
L2R1C.8	L2R1C.9	L2KICKPIA.1	RF.PULSECHARGE.1
RF.PULSERF.1	AccXpl2R5b	L2FECSTATS	PIASCOPE.2
IEARCALM.5	IEARCREf.10	RF.PULSEMOD.1	RF.Modulator
RF.Attenuator	RF.Multiplexer	RF.Phase	RF.Various
RF.SLED	RF104-PIA	RF125-PIA	L2R2C.8
TRIM_SEDAC_L2	L2TRIM.2	IECOOL.8	I2chopperHw
IELTEMP.3	L2CORMAG	L2STEER	L2MAGNETS
I2chopsrv	L2SMON.4	AlarmSammIer	ACCXPL2R1D.30
L2FanSrv	IEVAC.4	ACCXPL2BUNCH.0	SEKI.4
L2KICKER	PIAMON.40	L2R1C.10	TEMSENSORS
L2IMO.2	piCentDeLIP	PIABPM	L2R1C.11
PIAZYKSRV	ACCXPL2DIAG.1	PIAZYK.ML	GLOBALS.2
piFieldLinac2P	L2R1C.12	RF.BeamCurrentLi	ACCXPL2DIAG.2
piInfrastructure	L2PMARCH	I2PiCoPy	InstrPrxy.3
RF.PULSEIQ.1			



# .NET and mono

- Minimal client and server interface available for .NET applications !

e.g. VB.NET client

```
Public Sub updatePlot()  
    Dim i As Integer  
    bunProfCurve.Clear()  
    For i = 0 To 78  
        dataY(i) = currBuffer(i)  
        bunProfCurve.Add(dataY(i))  
    Next  
    bunchProfile.Refresh()  
End Sub  
  
Public Sub lcb(ByVal lnk As tine.TLink)  
    If bunchProfile.InvokeRequired Then  
        bunchProfile.Invoke(New MethodInvoker(AddressOf updatePlot))  
    Else  
        updatePlot()  
    End If  
End Sub  
  
Dim cb As TLink.TLinkCallback  
  
Private Sub Button1_Click(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles Button1.Click  
    Dim id As Integer  
    cb = New TLink.TLinkCallback(AddressOf lcb)  
    tdt = New TDataType(currBuffer)  
    tnull = New TDataType(IntPtr.Zero)  
    currLink = New TLink("/PETRA/BunchScope/Bunch-1", "BunchTrace.SCH", tdt, tnull, tine.Access.CA_READ)  
    id = currLink.Attach(tine.Modes.CM_DATACHANGE, cb, 1000)  
End Sub  
End Class
```

# .NET and mono

e.g. VB server (some declarations)

```
Imports System.Runtime.InteropServices
Imports tme
Public Class Form1
    <StructLayout(LayoutKind.Sequential, Pack:=1, CharSet:=CharSet.Ansi)> _
    Public Structure SineInfo
        Public amplitude As Single
        Public frequency As Single
        Public noise As Single
        Public phase As Single
        Public numberCalls As Integer
        <MarshalAs(UnmanagedType.ByValArray, SizeConst:=64)> _
        Public description() As Char
    End Structure
    Private Const PRP_SINE = 1
    Private Const PRP_AMPLITUDE = 2
    Private Const PRP_FREQUENCY = 3
    Private Const PRP_PHASE = 4
    Private Const PRP_NOISE = 5
    Private Const PRP_INFO = 6
    Private Const NUM_DEVICES = 10
    Private Const NUM_VALUES = (1024 * 8)
    Dim sinbuf(NUM_DEVICES - 1, NUM_VALUES - 1) As Single
    Dim tts As TTaggedStruct
    Dim sineInfoTable(NUM_DEVICES - 1) As SineInfo
    Dim myeqm As TEquipmentModule

    Public Function sineqm(ByVal dev As String, ByVal prp As String, ByVal dout As TDataType, ByVal din As T

        Dim fval As Single
        Dim maxfreq(NUM_DEVICES) As Single
```

# .NET and mono

e.g. VB server (some initialization)

```
Public Sub sinbkg()  
    Dim i As Integer  
    For i = 0 To NUM_DEVICES - 1  
        Call updateSine(i)  
    Next  
End Sub  
  
Public Sub sinini()  
    Dim i As Integer, k As Integer  
    Dim dsc As String  
    For i = 0 To NUM_DEVICES - 1  
        sineInfoTable(i).amplitude = 256  
        sineInfoTable(i).frequency = 1  
        sineInfoTable(i).phase = 0  
        sineInfoTable(i).noise = 5.0  
        ReDim sineInfoTable(i).description(63)  
        dsc = "Sine device " + Str(i) + " at your service"  
        For k = 0 To Len(dsc) - 1  
            sineInfoTable(i).description(k) = dsc.Chars(k)  
        Next  
    Next  
End Sub  
  
Public Sub sinexi()  
    Console.WriteLine("server stopping")  
End Sub  
  
Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load  
  
    TKernel.InitializeServer()  
  
    tts = New TTaggedStruct(sineInfoTable)  
  
    myeqm = New TEquipmentModule("", "SINEQM", 0, AddressOf sineqm, AddressOf sinini, AddressOf sinbkg, 1000, AddressOf  
  
    TKernel.StartServices()  
  
End Sub  
End Class
```

# .NET and mono

```
Public Function sineqm(ByVal dev As String, ByVal prp As String, ByVal dout As TDataType, ByVal din As TDataType, ByV

    Dim fval As Single
    Dim marray(NUM_DEVICES) As Single
    Dim cc As Integer, i As Integer
    Dim devnr As Integer
    Dim prpid As Integer

    devnr = eqm.GetDeviceNumber(dev, prp)
    prpid = eqm.GetPropertyId(prp)
    Select Case prpid
        Case PRP_SINE
            cc = Errors.illegal_read_write
            If ((acc And Access.CA_WRITE) = 0) Then
                cc = dout.PutData(sinbuf, devnr, NUM_VALUES, 0)
                sineInfoTable(devnr).numberCalls = sineInfoTable(devnr).numberCalls + 1
            End If
        Case PRP_AMPLITUDE
            If (din.GetDataArrayLength() > 0) Then
                If ((acc & Access.CA_WRITE) <> Access.CA_WRITE) Then
                    cc = Errors.illegal_read_write
                End If
                cc = din.GetData(fval)
                If cc <> 0 Then Exit Select
                sineInfoTable(devnr).amplitude = fval
            End If
            If (dout.GetDataArrayLength() > 0) Then
                For i = 0 To NUM_DEVICES - 1
                    marray(i) = sineInfoTable(i).amplitude
                    cc = dout.PutData(marray, NUM_DEVICES, devnr)
                    If cc <> 0 Then Exit Select
                Next
            End If
        Case PRP_FREQUENCY
            If (din.GetDataArrayLength() > 0) Then
                If ((acc & Access.CA_WRITE) <> Access.CA_WRITE) Then
```

e.g. VB server (equipment module)

# [ .NET and mono ]

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- C# similar to java (and vb.NET with different syntax)
- Mono demo .....