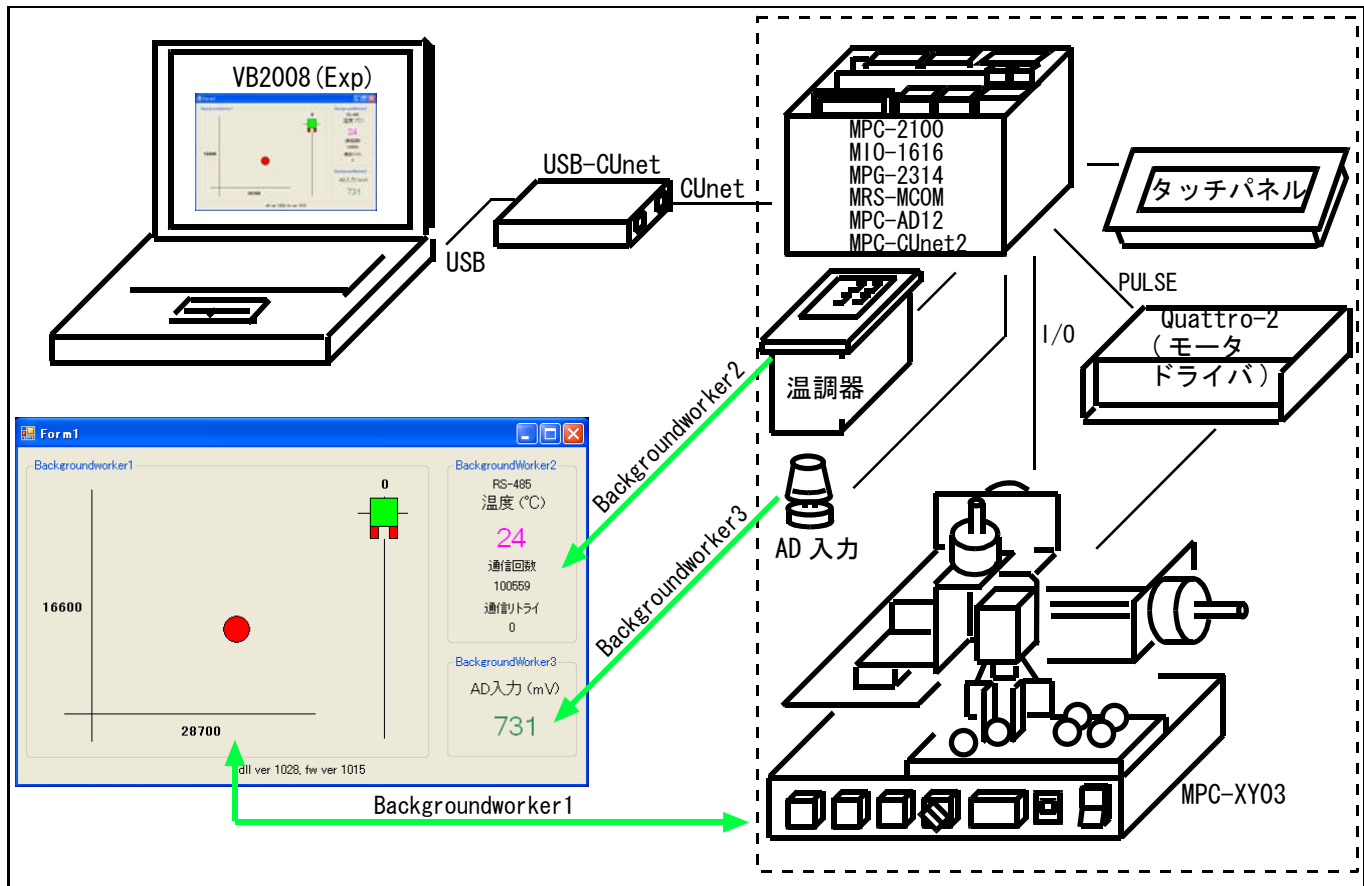


<b>Application Note</b>		資料作成 100531	資料番号 an2k-021
テーマ	USB-CUnet を Backgroundworker でマルチスレッド制御		
使用機器	MPC、Windows XP、VB2008 Express Edition		

### ■機器構成



### ■概要

- usbcunet.dll ver1028 でセマフォ付きの関数をサポートしました。VB2008(Exp)の BackgroundWorker とセマフォ関数を使いマルチスレッドで CUnet 通信を行います。

BackgroundWorker1 : MPC-XY03 の座標値とメカチャックの開閉状態を取得し、イメージの移動と入れ替えを行う。

BackgroundWorker2 : 温度器の温度、通信回数、通信リトライ回数を取得して表示する。

BackgroundWorker3 : AD 値を取得して表示する。

- それぞれの BackgroundWorker は非同期で CUnet のグローバルメモリを読み書きする dll 関数をコールします。つまり 3 本のスレッドが勝手に動きます。

### ■セマフォ関数宣言例

セマフォ関数は末尾が “\_s” です。次の宣言ではセマフォ関数を従来の関数名に置き換えています。仕様は従来の関数と同等です(dll には従来の関数も入っています)。

```

Declare Function cunet_in Lib "usbcunet.dll" Alias "cunet_in_s" _
    (ByVal adr As Integer, ByVal siz As Integer) As Integer
Declare Sub cunet_out Lib "usbcunet.dll" Alias "cunet_out_s" _
    (ByVal dat As Integer, ByVal adr As Integer, ByVal siz As Integer)
Declare Function cunet_sw Lib "usbcunet.dll" Alias "cunet_sw_s" _
    (ByVal adr As Integer) As Integer
Declare Sub cunet_on Lib "usbcunet.dll" Alias "cunet_on_s" _
    (ByVal adr As Integer)
Declare Sub cunet_off Lib "usbcunet.dll" Alias "cunet_off_s" _
    (ByVal adr As Integer)
Declare Sub cunet_in_blk Lib "usbcunet.dll" Alias "cunet_in_blk_s" _
    (ByVal stadr As Integer, ByVal length As Integer, ByRef ar As Integer)
Declare Sub cunet_out_blk Lib "usbcunet.dll" Alias "cunet_out_blk_s" _
    (ByVal stadr As Integer, ByVal length As Integer, ByRef ar As Integer)
Declare Function cunet_post_pnt Lib "usbcunet.dll" Alias "cunet_post_pnt_s" _
    (ByVal dest_sa As Integer, ByVal ar_top As Integer, ByRef send_ar As Integer) As Integer

```

```

Declare Function cunet_post_mbk Lib "usbconet.dll" Alias "cunet_post_mbk_s" _
    (ByVal dest_sa As Integer, ByVal ar_top As Integer, ByRef send_ar As Integer) As Integer
Declare Function cunet_post_mbk_lng Lib "usbconet.dll" Alias "cunet_post_mbk_lng_s" _
    (ByVal dest_sa As Integer, ByVal ar_top As Integer, ByRef send_ar As Integer) As Integer
Declare Function cunet_post_io Lib "usbconet.dll" Alias "cunet_post_io_s" _
    (ByVal dest_sa As Integer, ByVal ar_num As Integer, ByVal send_data As Integer) As Integer
Declare Function cunet_post_io_blk Lib "usbconet.dll" Alias "cunet_post_io_blk_s" _
    (ByVal dest_sa As Integer, ByVal ar_top As Integer, ByRef send_ar As Integer) As Integer
Declare Function cunet_post_pnt_str Lib "usbconet.dll" Alias "cunet_post_pnt_str_s" _
    (ByVal dest_sa As Integer, ByVal ar_top As Integer, ByVal send_str As String) As Integer
Declare Function cunet_post_mbk_str Lib "usbconet.dll" Alias "cunet_post_mbk_str_s" _
    (ByVal dest_sa As Integer, ByVal ar_top As Integer, ByVal send_str As String) As Integer
Declare Function cunet_req_pnt Lib "usbconet.dll" Alias "cunet_req_pnt_s" _
    (ByVal req_sa As Integer, ByVal ar_top As Integer, ByRef rcv_ar As Integer) As Integer
Declare Function cunet_req_mbk Lib "usbconet.dll" Alias "cunet_req_mbk_s" _
    (ByVal req_sa As Integer, ByVal ar_top As Integer, ByRef rcv_ar As Integer) As Integer
Declare Function cunet_req_mbk_lng Lib "usbconet.dll" Alias "cunet_req_mbk_lng_s" _
    (ByVal req_sa As Integer, ByVal ar_top As Integer, ByRef rcv_ar As Integer) As Integer
Declare Function cunet_req_io Lib "usbconet.dll" Alias "cunet_req_io_s" _
    (ByVal req_sa As Integer, ByVal ar_num As Integer, ByRef rcv_data As Integer) As Integer
Declare Function cunet_req_io_blk Lib "usbconet.dll" Alias "cunet_req_io_blk_s" _
    (ByVal req_sa As Integer, ByVal ar_top As Integer, ByRef rcv_ar As Integer) As Integer
Declare Function cunet_req_pnt_str Lib "usbconet.dll" Alias "cunet_req_pnt_str_s" _
    (ByVal req_sa As Integer, ByVal ar_top As Integer, ByVal rcv_str As String, _
    ByRef str_len As Integer) As Integer
Declare Function cunet_req_mbk_str Lib "usbconet.dll" Alias "cunet_req_mbk_str_s" _
    (ByVal req_sa As Integer, ByVal ar_top As Integer, ByVal rcv_str As String, _
    ByRef str_len As Integer) As Integer
Declare Function cunet_peek Lib "usbconet.dll" Alias "cunet_peek_s" _
    (ByVal adr As Integer) As Integer
Declare Function cunet_peek_lng Lib "usbconet.dll" Alias "cunet_peek_lng_s" _
    (ByVal adr As Integer) As Integer
Declare Sub cunet_poke Lib "usbconet.dll" Alias "cunet_poke_s" _
    (ByVal dat As Integer, ByVal adr As Integer)
Declare Sub cunet_poke_lng Lib "usbconet.dll" Alias "cunet_poke_lng_s" _
    (ByVal dat As Integer, ByVal adr As Integer)
Declare Sub cunet_poke_msb Lib "usbconet.dll" Alias "cunet_poke_msb_s" _
    (ByRef ar As Integer)
Declare Sub cunet_peek_mrb0 Lib "usbconet.dll" Alias "cunet_peek_mrb0_s" _
    (ByRef ar As Integer)
Declare Sub cunet_peek_mrb1 Lib "usbconet.dll" Alias "cunet_peek_mrb1_s" _
    (ByRef ar As Integer)
Declare Function cunet_chk_mfr Lib "usbconet.dll" Alias "cunet_chk_mfr_s" _
    (ByVal sa As Integer) As Integer
Declare Function cunet_chk_run Lib "usbconet.dll" Alias "cunet_chk_run_s" _
    () As Integer
Declare Function cunet_chk_mcare Lib "usbconet.dll" Alias "cunet_chk_mcare_s" _
    () As Integer
Declare Function cunet_chk_lcare Lib "usbconet.dll" Alias "cunet_chk_lcare_s" _
    () As Integer
Declare Function cunet_chk_scnt Lib "usbconet.dll" Alias "cunet_chk_scnt_s" _
    () As Integer
Declare Sub cunet_set_delay Lib "usbconet.dll" Alias "cunet_set_delay_s" _
    (ByVal ms As Integer)

```

## ■VB サンプルプログラム

```
Imports System.Threading
```

```
Public Class Form1
```

```

    Delegate Sub lblSetString(ByVal lbl As Object, ByVal text As String)
    Delegate Sub picboxMove(ByVal picbox As Object, ByVal xp As Integer, ByVal yp As Integer)
    Delegate Sub picboxImage(ByVal d_picbox As Object, byval s_picbox As Object)

```

```

    Private Sub showlbl(ByVal sender As Object, ByVal st As String)
        Dim lbl As Label = DirectCast(sender, Label)
        lbl.Text = st
    End Sub

```

```

    Public Sub movePic(ByVal sender As Object, ByVal xp As Integer, ByVal yp As Integer)
        Dim picbox As PictureBox = DirectCast(sender, PictureBox)
        picbox.Location = New Point(xp, yp)
    End Sub

```

```

    Public Sub changePic(ByVal d_sender As Object, ByVal s_sender As Object)
        Dim d_picbox As PictureBox = DirectCast(d_sender, PictureBox)
        Dim s_picbox As PictureBox = DirectCast(s_sender, PictureBox)
        d_picbox.Image = s_picbox.Image
    End Sub

```

```
Private Sub Form1_Load(ByVal sender As System.Object, ByVal e As System.EventArgs) Handles MyBase.Load
```

```

If cunet_usb_open() <> 1 Then
    MsgBox("usbcunet open error")
End
End If
Label13.Text = "dll ver " + CStr(cunet_dll_ver()) + ", fw ver " + CStr(cunet_fw_ver())
cunet_init(255, 0, 0) 'usbcunet 初期化
Thread.Sleep(500)
cunet_init(0, 4, 11) 'usbcunet SA 宣言、エリア確保

StartThread() 'スレッド開始
End Sub

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

Private Sub StartThread()
    BackgroundWorker1.WorkerSupportsCancellation = True
    BackgroundWorker1.RunWorkerAsync()
    BackgroundWorker2.WorkerSupportsCancellation = True
    BackgroundWorker2.RunWorkerAsync()
    BackgroundWorker3.WorkerSupportsCancellation = True
    BackgroundWorker3.RunWorkerAsync()
End Sub

Private Sub StopThread()
    If BackgroundWorker1.IsBusy Then
        BackgroundWorker1.CancelAsync()
    End If
    If BackgroundWorker2.IsBusy Then
        BackgroundWorker2.CancelAsync()
    End If
    If BackgroundWorker3.IsBusy Then
        BackgroundWorker3.CancelAsync()
    End If
    While BackgroundWorker1.IsBusy = True
        Application.DoEvents()
    End While
    While BackgroundWorker2.IsBusy = True
        Application.DoEvents()
    End While
    While BackgroundWorker3.IsBusy = True
        Application.DoEvents()
    End While
End Sub

'XYZ 表示スレッド
Private Sub BackgroundWorker1_DoWork(ByVal sender As System.Object, _
    ByVal e As System.ComponentModel.DoWorkEventArgs) Handles BackgroundWorker1.DoWork
    Dim xp, yp, zp As Integer

    Do

        While cunet_sw(2360) = 0 'MPC とのインターロック。MPC のデータ書き込み完了待ち
            If BackgroundWorker1.CancellationPending Then Exit Do
            Application.DoEvents()
        End While

        xp = cunet_in(2032, Cu_Lng) 'X 軸座標値
        yp = cunet_in(2036, Cu_Lng) 'Y 軸座標値
        zp = cunet_in(2040, Cu_Lng) 'Z 軸座標値

        Me.Invoke(New lblSetText(AddressOf showlbl), Label1, CStr(xp))
        Me.Invoke(New lblSetText(AddressOf showlbl), Label2, CStr(yp))
        Me.Invoke(New lblSetText(AddressOf showlbl), Label3, CStr(zp))
        xp = (xp / 200) + 60 - GroupBox1.Left
        yp = 250 - (yp / 200) - GroupBox1.Top
        zp = (zp / 100 * -1) + 50 - GroupBox1.Top
        Me.Invoke(New pictureBoxMove(AddressOf movePic), PictureBox1, xp, yp)
        Me.Invoke(New pictureBoxMove(AddressOf movePic), PictureBox2, 350 - GroupBox1.Left, zp)

        cunet_on(2104) 'MPC とのインターロック。MPC へ作業完了通知
        While cunet_sw(2360) = 1 'MPC とのインターロック。MPC の応答待ち
            If BackgroundWorker1.CancellationPending Then Exit Do
            Application.DoEvents()
        End While
        cunet_off(2104) 'MPC とのインターロック。完了

        If cunet_sw(2352) = 1 Then 'メカチャック開閉状態でイメージを交換
            Me.Invoke(New pictureBoxImage(AddressOf changePic), PictureBox2, PictureBox3) '閉の絵
        Else

```

```

        Me.Invoke(New PictureBoxImage(AddressOf changePic), PictureBox2, PictureBox4) '開の絵
    End If

    Application.DoEvents()
    Thread.Sleep(10)

Loop
End Sub

'温度表示
Private Sub BackgroundWorker2_DoWork(ByVal sender As System.Object, _
    ByVal e As System.ComponentModel.DoWorkEventArgs) Handles BackgroundWorker2.DoWork
    Dim ondo As Integer
    Do
        If BackgroundWorker2.CancellationPending Then Exit Do
        ondo = cunet_in(2064, Cu_Int) '温度データ
        If (ondo And &H80) <> 0 Then ondo = ondo - 256 'マイナスだったら
        Me.Invoke(New lblSetString(AddressOf showlbl), Label14, CStr(ondo)) '温度表示
        Me.Invoke(New lblSetString(AddressOf showlbl), Label18, _
            CStr(cunet_in(2066, Cu_Lng))) '通信回数
        Me.Invoke(New lblSetString(AddressOf showlbl), Label11, _
            CStr(cunet_in(2070, Cu_Wrd))) '通信リトライ回数

        Application.DoEvents()
        Thread.Sleep(10)
    Loop
End Sub

'AD入力表示
Private Sub BackgroundWorker3_DoWork(ByVal sender As System.Object, _
    ByVal e As System.ComponentModel.DoWorkEventArgs) Handles BackgroundWorker3.DoWork
    Dim ad As Integer
    Do
        If BackgroundWorker3.CancellationPending Then Exit Do
        ad = cunet_in(2080, Cu_Wrd) 'AD値
        Me.Invoke(New lblSetString(AddressOf showlbl), Label16, CStr(ad))

        Application.DoEvents()
        Thread.Sleep(10)
    Loop
End Sub

End Class

```