ScriptWorX2010 – Easy Integration with OPC Enabled Global Variables

APPLICATIONS NOTE

April 2010

Description: Guide to global variables in ScriptWorX2010
OS Requirement: Win 2000, XP Pro, Server 2003, Vista, Server 2008, Windows 7
General Requirement: general knowledge of GENESIS32 and ScriptWorX2010 along with basic VBA coding skills.

Introduction

As discussed in the application note *ScriptWorX2010 – Features in the ScriptWorX2010*, we have implemented major changes on top of ScriptWorX32, resulting in a completely new product, ScriptWorX2010. Before reading this document, you should be familiar with GENESIS32 and ScriptWorX32. You should also read the application note titled *ScriptWorX2010 – Features in the ScriptWorX2010*, which would give you a general idea of what has changed in ScriptWorX2010.

This document will introduce you to the Global Variables that were newly implemented into ScriptWorX2010 and also utilize the new GenBroker Plug-ins (You can find more information about these plug-ins in the application note entitled *GENESIS32 – GenBroker Plug-ins Technology*).

OPC Enabled Global Variables

Values of ScriptWorX2010 Global Variables can be used in multiple scripts or even multiple Designers/Threads and custom applications. We have developed them to share their values within ScriptWorX2010 and also support OPC DA in such a way that ICONICS applications can read and write to the ScriptWorX2010 Global Variables values as standard OPC Clients.

ScriptWorX2010 Global Variables are accessible via OPC when ScriptWorX2010 is in Runtime mode or when a Designer/Thread (or a single script) executes a read or write command for a Global Variable. ScriptWorX2010 Global Variables provide many advantages because they are available to both scripts and OPC clients, and you can use the OnVarChange event to execute a script when the Global Variables change.

Basic Setup

1. Open ScriptWorX2010 by going to Start → Programs → ICONICS GENESIS32 → ScriptWorX → ScritptWorX2010
2. If this is the first time you are using ScriptWorX2010, create a new configuration file and a new project.
3. Create a new designer by right-clicking on the project and select New → Designer/Thread. Check the “Has Timer” checkbox in the VBA Designer Properties section in the right-hand pane, and then click on “Apply”.

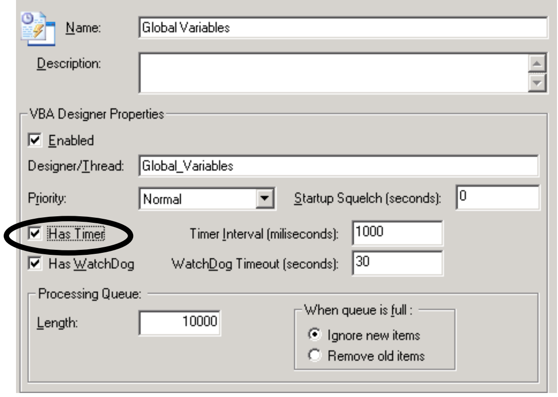

Name: Global Variables
Description:
VBA Designer Properties
☑ Enabled
Designer/Thread: Global_Variables
Priority: Normal
Startup Squelch (seconds): 0
☑ Has Timer
Timer Interval (miliseconds): 1000
☑ Has WatchDog
WatchDog Timeout (seconds): 30
Processing Queue:
Length: 10000
When queue is full :
● Ignore new items
○ Remove old items

Figure 1 - Designer Properties: Has Timer

4. Right-click on the Designer/Thread that you have just created and select new Script. Give the Script a name.
5. Click on the “Browse” ... button to bring up the Unified Data Browser. Select the “UDM Data tab”, and from the “Time Triggers” and select “Every 10 Sec” trigger. Click on “OK” to return to ScriptWorX2010.
6. Click on the “Edit VBA Code” button to bring up the VBA editor.
7. In the “NewScritp” sub, replace the “TODO: Add your code here” with the following code:

```
g.Variables.Write "MyGlobalVariable3", _
        g.Variables.Read("MyGlobalCounter"), g.Thread.Identif

g.Thread.ConsoleMsg MSG_INFO_VERBOSE, _
        "MyGlobalVariables Script", "Value changed at: " _
        & Time & " on " & Date
```

8. The first line will write to the ScriptWorX2010 Global Variable “MyGlobalVariable3”. The second line will enter a message into the appropriate thread console of MonitorWorX, which we will discuss later.

Initializing and Terminating Global VBA Variables

1. In the VBA editor, scroll to the top and add “Dim MyCounter As Integer” just bellow “Option Explicit”. This will create a counter that is shared for all scripts in this Thread/Designer.

   NOTE: The counter “MyCounter” is a variable of integer type globally used with respect to the Thread/Designer. ScriptWorX2010 Global Variables are global for all Designers/Threads and other ICONICS OPC clients in the form of OPC data.

2. In case you want to initialize your object properties (such as ScriptWorX2010 Global Variables) when the Thread / Designer starts, you can do it in the “GlobalInstance_OnConnection” sub. For instance, add the following lines bellow the “Private Sub

GlobalInstance_OnConnection" line in place of the "TODO" line:

```
g.Variables.Write "MyGlobalVariable1", 0, g.Thread.Identif
g.Variables.Write "MyGlobalVariable2", 0, g.Thread.Identif
g.Variables.Write "MyGlobalVariable3", 0, g.Thread.Identif
g.Variables.Write "MyGlobalVariable4", 0, g.Thread.Identif
g.ConsoleMsg MSG_INFORMATION, "GlobalVariables", _
    "MyGlobalVariable1 - MyGlobalVariable4 have been initialed"
```

3. This code will write the value of 0 into the Global Variables "MyGlobalVariable1" through "MyGlobalVariable4" It will also send a message to the MonitorWorX console. Because this code is in the GlobalInstance_OnConnection sub, it will be executed when this Thread/Designer starts.
4. Similarly, if you want to release or terminate some objects when a Designer/Thread is terminated, you can add your code into the "GlobalInstance_OnDisconnection" sub. We will not add any code here for this example.

OnTimer and OnVarChange Events

1. Scroll to the "Public Sub OnTimer" line and add these two lines in place of the "TODO" line:

```
g.Variables.Write "MyGlobalCounter", MyCounter, g.Thread.Identif
MyCounter = MyCounter + 1
```

2. This will write the current value of "MyCounter" variable into the "MyGlobalCounter" ScriptWorX2010 Global Variable then increase the value of the counter by one.
3. Go to the "Public Sub OnVarChange" and add the following lines in place of the "TODO" line:

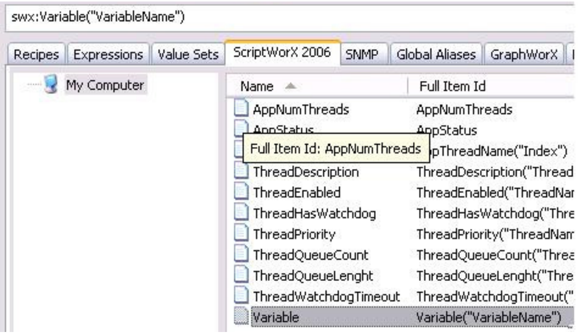
```
If name = "MyGlobalVariable1" Then

  g.Variables.Write "MyGlobalVariable2", newVal, g.Thread.Identif
  g.ConsoleMsg MSG_INFO_VERBOSE, "MyScript", _
     "Entered value " & newVal & " has been copied from" & _
     "MyGlobalVariable1 " & "into MyGlobalVariable2"

ElseIf name = "MyGlobalVariable3" And _
     threadIdentif <> g.Thread.Identif Then

  g.Variables.Write "MyGlobalVariable4", _
     g.Variables.Read ("MyGlobalCounter"), _
     g.Thread.Identif
  g.ConsoleMsg MSG_INFO_VERBOSE, "MyScript", "Value " _
     & newVal & _
     " from MyCounter has been written into MyGlobalVariable4"

End If
```

4. The "OnVarChange" sub is able to catch any change of any ScriptWorX2010 Global Variable. In that sub, we can check any of the following parameters to determine the name of the variable that changed and other properties about it. The parameters are:
   - name: Name of the global variable that has been changed
   - oldVal: Value of the variable before the change
   - newVal: Value of the variable after the change
   - threadIdentif: ID of the thread that wrote the new value
5. In our code, we checked if the variable changed was MyGlobalVariable1 or MyGlobalVariable3, and we preformed different actions depending on which variable was changed.

NOTE: Inserting a new value into a global variable will trigger the OnVarChange event, even if that change was made from the OnVarChange sub. Beware of infinite loops!

Testing the Script

1. Save your script by going to File → Save. Close the VBA editor and return to ScriptWorX2010 configurator.
2. Select File → Make All VBA Dlls, and then go into Runtime by selecting Action → Start Runtime (or clicking the traffic light).
3. To see the script in action, open a GraphWorX32 display by going to Start → Programs → ICONICS GENESIS32 → GraphWorX32 → GraphWorX32.
4. Insert a new process point (PPT/DE) and in the ICONICS Unified Data Browser navigate to the ScriptWorX2010 tab and select "Variable". Click on "OK".

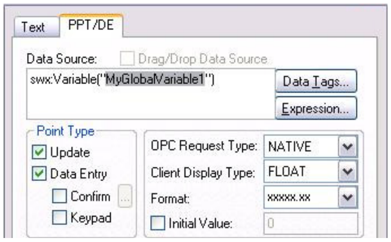


swx:Variable("VariableName")

Name	Full Item Id
AppNumThreads	AppNumThreads
AppStatus	AppStatus
	pThreadName("Index")
ThreadDescription	ThreadDescription("Thread
ThreadEnabled	ThreadEnabled("ThreadNar
ThreadHasWatchdog	ThreadHasWatchdog("Thre
ThreadPriority	ThreadPriority("ThreadNam
ThreadQueueCount	ThreadQueueCount("Threa
ThreadQueueLenght	ThreadQueueLenght("Thre
ThreadWatchdogTimeout	ThreadWatchdogTimeout("
Variable	Variable("VariableName")

Figure 2 - Selecting the Variable in Unified Data Browser

5. In the Property inspector of the PPT/DE, change the text "VariableName" to "MyGlobalVariable1", check the Data Entry check box and click OK.

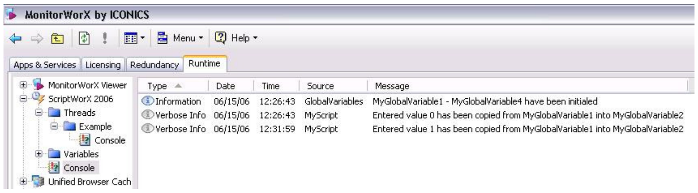


Data Source: ☐ Drag/Drop Data Source
swx:Variable("MyGlobalVariable1")
☑ Update
☑ Data Entry
☐ Confirm
☐ Keypad
OPC Request Type: NATIVE
Client Display Type: FLOAT
Format: xxxxx.xx
☐ Initial Value: 0

Figure 3 - Process Point Properties

6. Add another process point for "MyGlobalVariable2".
7. Enter runtime, now you can change the value in the "MyGlobalVariable1" PPT/DE and watch it automatically get copied by the script into the PPT/DE for "MyGlobalVariable2". This is being done by the OnVarChange script.
8. Go back to configuration mode and, using the same method as above, insert PPT/DE for these variables:
   - MyGlobalCounter
   - MyGlobalVariable3
   - MyGlobalVariable4

9. Put GraphWorX32 into runtime. Notice that "MyGlobalCounter" increases by one every second. This is because of our OnTimer script. Also, the "MyGlobalVariable3" PPT/DE gets the value from the "MyGlobalCounter" PPT/DE every 10 seconds due to our MyGlobalVariables script.
10. Insert a new value into the "MyGlobalVariable3" PPT/DE. Your new value is inserted into "MyGlobalVariable3" and the value from "MyGlobalCounter" is copied into "MyGlobalVariable4". This is also happening because of the OnVarChange script.
11. You can see the messages we are writing to MonitorWorX.
12. Launch MonitorWorX by going to Start → Programs → ICONICS Tools → MonitorWorX.
13. Go to the Runtime tab of MonitorWorX and select ScriptWorX2010 → Console.



Type	Date	Time	Source	Message
Information	06/15/06	12:26:43	GlobalVariables	MyGlobalVariable1 - MyGlobalVariable4 have been initialed
Verbose Info	06/15/06	12:26:43	MyScript	Entered value 0 has been copied from MyGlobalVariable1 into MyGlobalVariable2
Verbose Info	06/15/06	12:31:59	MyScript	Entered value 1 has been copied from MyGlobalVariable1 into MyGlobalVariable2

Figure 4 - MonitorWorX Console