

TRENDWORX32 V8

Performance White Paper

Version 8
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OPC Automation at your fingertips

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1 About This Document

1.1 Scope of the Document

With this in mind, it is hoped that this document will prove useful in understanding some of the benefits of the features offered by ICONICS.

1.2 Revision History

Version 1.0 - Madhavi, March 2004

Version 8.0 - RLA, August 6, 2004

1.3 Definitions

2 Introduction

This document is written to outline a set of experiments, with their corresponding results, used to test the effectiveness of changes in the TrendWorX32 Version 8 viewer in conjunction with modifications to GenBroker over TCP/IP Channels. Specifically, these experiments are designed to examine the initial speed up initial display animation for GenBroker based on TrendWorX32 V8 historical replay.

2.1 Objective

The objective of this set of experiments is to determine the relative speed-up in load time that newer, improved TrendWorX32 viewer files and GenBroker files provide both in conjunction with each other and independent of each other. The goal was to find whether the changes in either the Trend Viewer V8 or GenBroker showed dramatic change over the other, and whether the changes in the two sets of files were compatible with each other.

3 Performance Test Setup

Two PC's have been isolated on a closed network, utilizing a 3-Com, Office Connect 100 MB/s Ethernet Switch.

3.1 Hardware Used

Server (Master):
Intel Pentium @ 200MHZ
96 MB Ram
Windows 2000

Client (T2):
AMD K-6
256 MB Ram
Windows 2000

3.2 Software Configuration

3.2.1 Server

The server in these set up as a TrendWorX32 Historical Data Logger. There is one configuration, logging to a single database via the Microsoft Access Driver. In this configuration, there is one logging group set up to log seven simple tags from the Simulator OPC Server.

3.2.1.1 Logging Group Parameters

Data Collection Rate	1 second
Calculation Period	1 second
Logging	On 30 second interval
Maximum Tables	10
Create New Table	4 hours

3.2.1.2 OPC Tags

ICONICS.Simulator.1\SimulatePLC.InltFanSp
ICONICS.Simulator.1\SimulatePLC.PumpSpeed
ICONICS.Simulator.1\SimulatePLC.PumpStatus
ICONICS.Simulator.1\SimulatePLC.Ramp
ICONICS.Simulator.1\SimulatePLC.Random
ICONICS.Simulator.1\SimulatePLC.Sine
ICONICS.Simulator.1\SimulatePLC.Square

These values were kept logging for a couple of days. Valid comparison results, however, can be seen after only one hour of logging.

GenBroker was set up to use a GenBroker Configuration file (rather than Direct OPC). The file itself was set up to open a direct OPC Channel to the client. When the updated GenBroker files were used, the windows "host" file was modified to contain eight copies of the client's IP address, followed by the server's name followed by the letters "a" through "h" respectively. This allows GenBroker to utilize multiple channels.

3.2.2 Client

The Client PC was set up to launch GraphWorX32 displays containing embedded Trend Viewers with varying historical pen configurations. Specifically, there are five different GraphWorX32 Displays.

Main Display: (DisplayGBEmpty.gdf) There is one main display, containing no Trend Viewers, which serves as a “Startup” display. This display simply has links to the other four displays. The intention is that one goes into runtime while visiting this main display, and then uses the links within the display to visit the other four displays. Additionally, this display has a button attached to a VBA Script that will log a string to a log file that can be used as a comment describing the benchmark test that is about to be performed.

Single Trend Viewer (DisplayGBITrend.gdf): This display contains a single trend viewer that requests all of the Historical tags logged on the server. The purpose of this display is to record how long it takes from the time the display is loaded, until various stages of loading the pens in the viewer, or the viewer itself. To ease this process, VBA Code has been added to the display. The following events play a crucial role in recording load time.

- `Private Sub GwxDisplay_PreAnimateDisplay()`

This method serves as the “Start Time.” It is fired as soon as the display loads. The VBA Code records the current time.

- `Private Sub TWXViewer1_InAnimateMode()`

This method is fired once the Trend Viewer is loaded. This event corresponds roughly to the time when the GraphWorX32 display is able to refresh itself and respond to user interaction. The VBA Code records the current time to later be subtracted from the start time.

- `Sub DataSeen(o As GwxPick)`

This method responds to a push button on the display and requires user-intervention to fire (does not automatically happen like the “InAnimateMode()” Method.) As soon as the user sees a pen in the Trend Viewer, he is to press this Button. The VBA code will then record the current time to be subtracted from the start time.

- `Sub DataComplete(o As GwxPick)`

This method responds to a push button on the display that is pressed by the user when **all** of the pens are visible in the viewer. The VBA code behind this event does several things. First, the code records the current time to be compared to the start time. Next, all of the total times for various events are computed and displayed to the user in a message box that looks like the following...

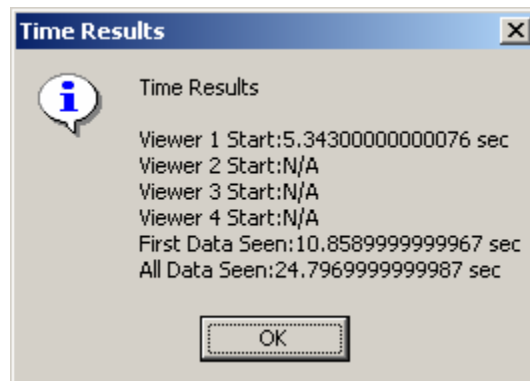


Figure 1: Results of test after all data seen

The data recorded is then automatically logged to a file for later retrieval. With the data, the name of the

GraphWorX32 display file and the time of the test are recorded. Lastly, the VBA Code automatically brings the user back to the main display.

Four Trend Viewers (DisplayGB4Trend.gdf): This display is much like the “Single Trend Viewer” display; only it contains four viewers, each requesting all seven historical pens, rather than one viewer. This display is intended as an added stress test that exemplifies the long delay in showing historical data reported in Version 7.0. The VBA Code for this display is the same, but has the addition of three events, namely “TWXViewer2_InAnimateMode”, “TWXViewer3_InAnimateMode”, “TWXViewer4_InAnimateMode.” These three events capture the “readiness” of the other three trend viewers and fill in the data, which reads “N/A” in the case of the single viewer (figure 1) with real load times. It should also be noted that the “DataSeen” event button should now be pressed when the first of **any** of the viewers displays a pen, and the “DataComplete” event button should now be pressed when **all** of the viewers have loaded **all** of their pens.

Single Trend Viewer History (DisplayGB1TrendHist.gdf): This display is identical to the “Single Trend Viewer” display; only the embedded Trend Viewer is in “History” mode.

Four Trend Viewers History (DisplayGB4TrendHist.gdf): This display is identical to the “Four Trend Viewer” display; only the embedded Trend Viewers are in “History” mode.

GenBroker was set up to use a GenBroker Configuration file (rather than Direct OPC). The file itself was set up to open a direct OPC Channel to the server. When the updated GenBroker files were used, the windows “host” file was modified to contain eight copies of the server’s IP address, followed by the server’s name followed by the letters “a” through “h” respectively. This allows GenBroker to utilize multiple channels.

4 Procedure

The Server was configured to log data and did so for a couple of days. Once the data had been logged, all permutations of the following variables had to be tested on each of the four GraphWorX32 displays.

Version 7.0 vs. updated GenBroker Files (Single Channel Vs. Multiple Channels)

Version 7.0 vs. updated Trend Viewer Files

GenBroker Server “Smoother Updates” On/Off

Two Trials were done for each display on each of the eight permutations, resulting in 64 experimental data elements. An “experimental data result” refers to a set of data indicating load time for the viewer(s), first data seen, and all data seen.

4.1 Procedure Supplemental

After the results of the procedure had been completed, some newer Trend Viewer and GenBroker files were introduced with the intention of being tested in conjunction. (Eliminating the need to see how they perform independently of each other). A new set of experiments was done with only one variable to test; Version 7.0 vs. updated GenBroker and Trend Viewer Files working together. (The elimination of the “Smoother Updates” variable is explained in the Experimental Results section.

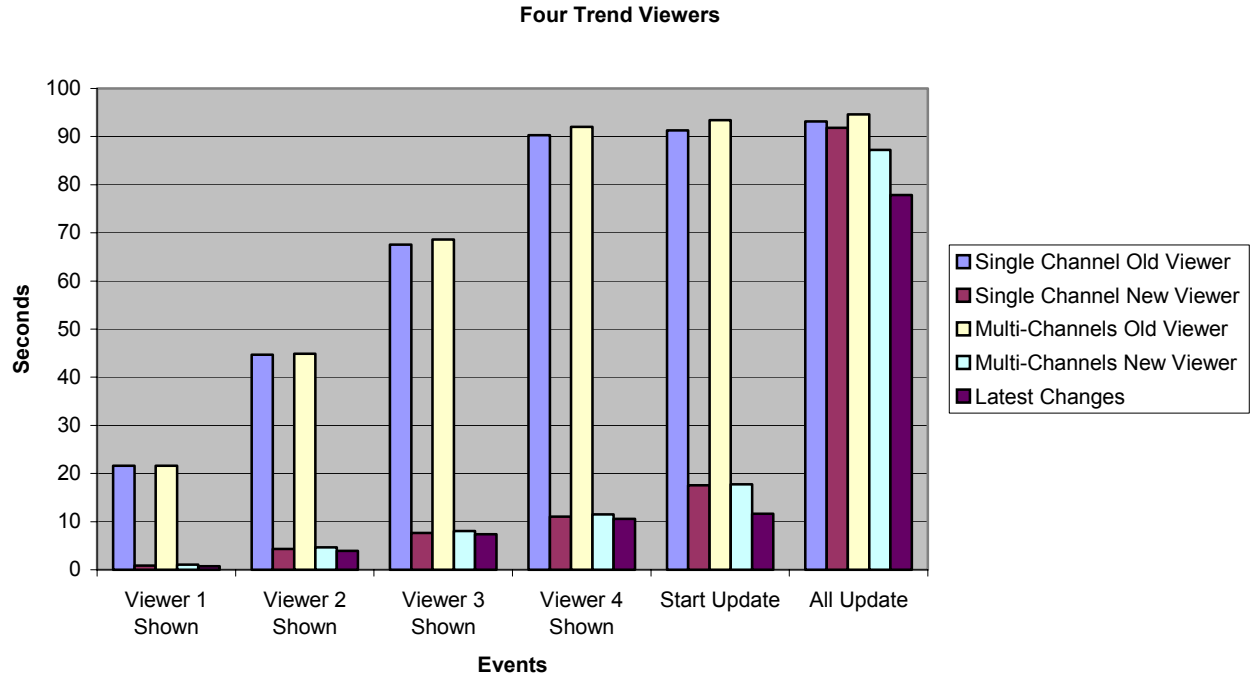
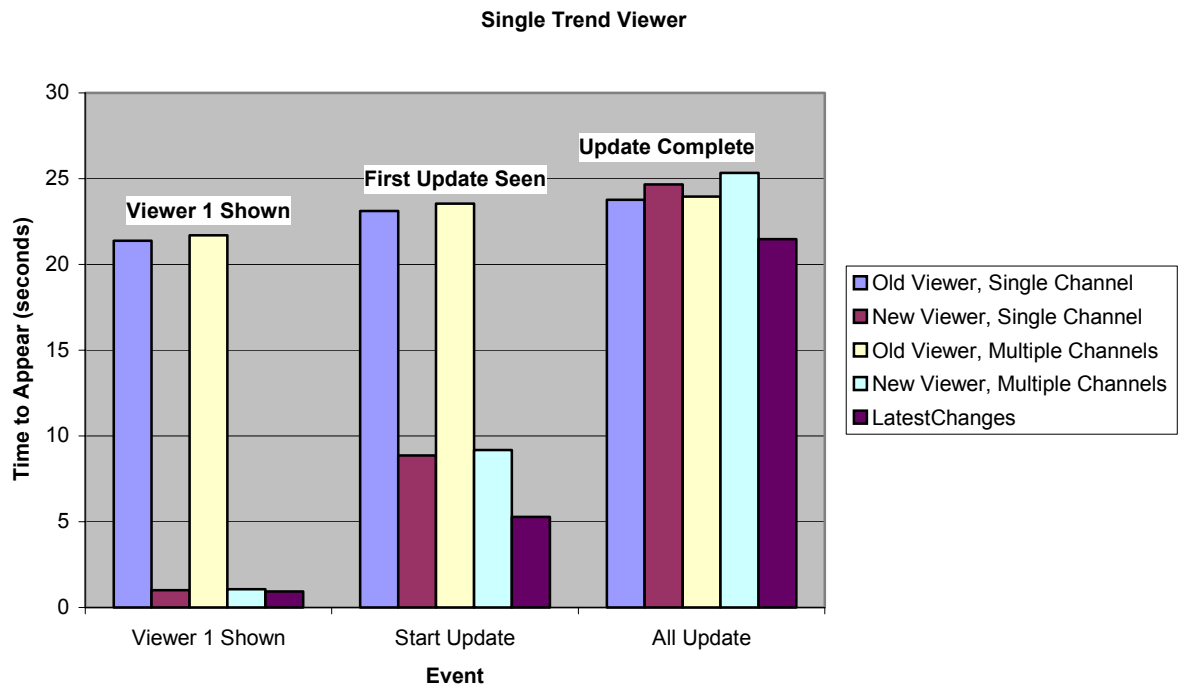
5 Experimental Results

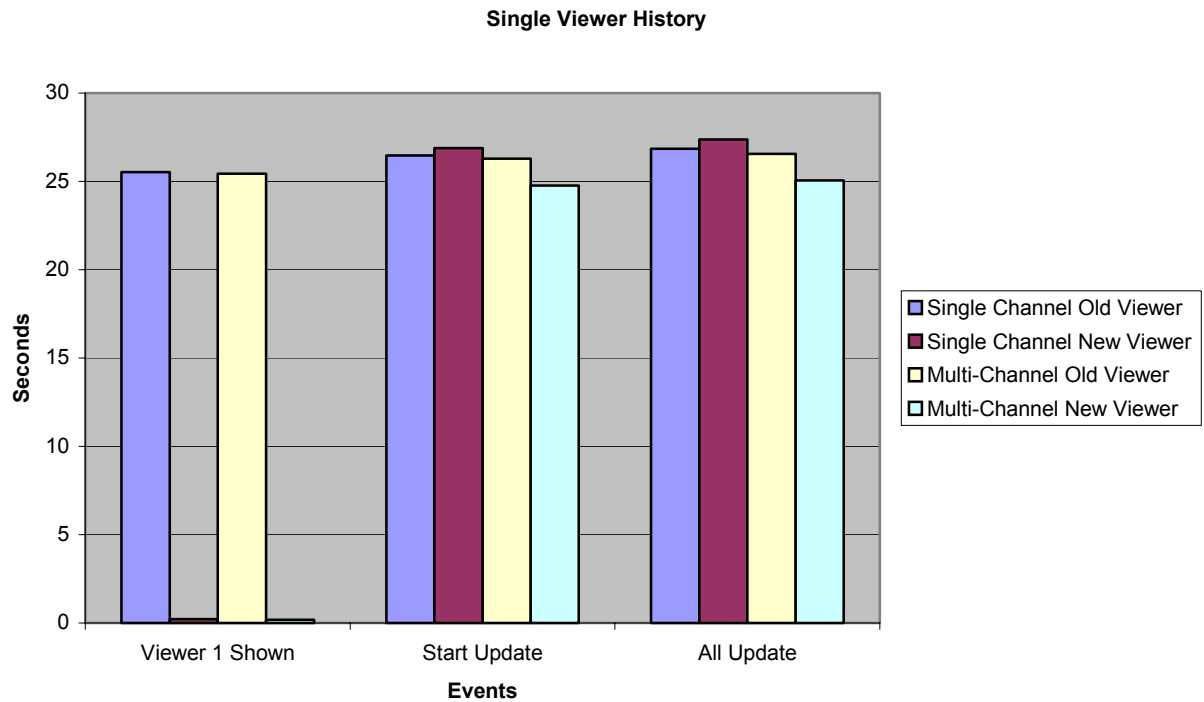
The data from all of the values logged from going through the Displays were neatly organized in a Microsoft Excel file. Results for each type of display were separated. Four columns were then set up indicating the three variables described in the procedure, and an indication of “Trial 1” or “Trial 2”. Visual inspection immediately revealed that the “Smoother Updates” variable had virtually no effect on the results. Therefore for each permutation of “New Vs. Old Trend Viewer” and “New Vs. Old GenBroker”, the four results from the two trials, with smoother updates on and off were all averaged together. After these values were averaged together, there were four sets of data for each GraphWorX32 display, indicating the four permutations of old and new Trend and GenBroker files. These remaining data were easily plotted onto an Excel chart for each GraphWorX32 display with four series representing each of the four permutations and each time stage (Trend Viewer ready, data first seen, all data seen) appearing as a separate plot on the graph.

5.1 Supplemental Experimental Results

Roughly a week after the first part of the experiment was completed, the new GenBroker and Trend Viewer files were presented. A new set of data was logged over a weekend, and readings for Version 7.0 and readings for the new files were taken. Since data was taken over a weekend rather than over a couple days, the “Version 7.0” results were slightly slower in this experiment than in the first. Since the “Version 7.0” results behave as somewhat of a control in the experiment (nothing changed except for the amount of data logged), they were used as a “correction” factor in comparing the results of experiment number 2 with the original experiment a week before. Using only Version 7.0 software components, under two days of logging, the single trend viewer display took an average of 23.77 seconds to load. After a weekend of logging, the single trend viewer display took an average of 25.76 seconds. Likewise, the four-trend display took 93.14 and 99.36 seconds respectively. Since all other elements were equal, one could say there is about a 93% correction factor between the weekend logging results and the 2-day logging results. In order to append the supplemental experimental results to the original experimental results, all values were multiplied by 0.93 to match the corrected “control” time. In the final graphs, the results of the newest files appear as a fifth series with a correction factor that ensures correct proportionality with the Version 7.0 results.

5.2 Charts and Data





Note: Latest Trend Viewer and GenBroker files were not included in the graph as visual inspection did not show any significant improvement over original results.

Note: Multi Viewer History not shown, as results did not differ from single viewer case. Furthermore, given the synchronous nature of “Historical” Mode, there was no logical reason to expect that asynchronous changes to the Trend Viewer would greatly affect historical replay.

6 Reproducing the Experiment

All of the files used on the Client and on the Server have been added to a ProjectWorX32 project and compressed into a .PWX zipped project. The “Main” Display, GenBroker Configuration file, and Active Trend Logging Database have all been set as the “Main” elements in the project. Activation of the project should set up all of the necessary files.

7 Conclusion

It is evident that the newly rewritten Trend ViewerV8 product greatly improves the time it takes to see the first pen, and greatly reduces the time in which the GraphWorX32 display appears to be “locked up.” Neither the new, multi-channel GenBroker, nor the new TrendWorX32 Viewer files; however, seem to greatly help the total time for all of the pens to load. In the case of multiple viewers, however, there is some noticeable difference when the new GenBroker and Trend Viewer files are working in conjunction with each other.

The second phase, with even newer Trend Viewer and GenBroker files is more encouraging. We see from the graph that there is yet another drop in the time it takes to first view the data, and a solid 10 to 15 percent drop from Version 7.0 in the time it takes all of the pens to appear.