2010

HYPER HISTORIAN PERFORMANCE

An ICONICS Whitepaper

CONTENTS

1 About This Document

1.1 Scope of the Document

This document contains information on performance tests and the results of those performance tests that were run on ICONICS Hyper Historian V10.01. It may be of use to companies who are considering the purchase of the Hyper Historian. These benchmarks can be used to help determine which version of the Hyper Historian is needed for a particular application and what the most appropriate hardware for hosting the Hyper Historian may be.

The performance tests include several sample test scenarios. The Hyper Historian CPU usage and Virtual Memory usage are measured for each test scenario. The control variables for the test cases include:

- The number of tags being logged
- The data types of the tags being logged
- The speed/rate at which the tag values change

1.2 Revision History

Version 0.1 – ICONICS, Inc., September 10, 2008 (initial draft)
Version 0.2 – ICONICS, Inc., October 1, 2008 (updated several test cases)
Version 1.0 – ICONICS, Inc., December 1, 2008 (updated introduction and summary)

1.3 Definitions

The following are acronyms used in this document, and are presented here for reference:

BACnet – Building Automation and Control Networks
DCS – Distributed Control System
HH – Hyper Historian
HMI – Human Machine Interface
I/O – Input / Output
LAN – Local Area Network
OPC DA – OPC Data Access
OPC A/E – OPC Alarms and Events
OPC HDA – OPC Historical Data Access
OPC UA – OPC Unified Architecture
PLC – Programmable Logic Controller
SCADA – Supervisory Control and Data Acquisition
SNMP – Simple Network Management Protocol

2 Introduction

ICONICS Hyper Historian is the first true Microsoft Windows® 64-bit, high-performance, robust, scalable and secure Enterprise-wide, real-time data historian. Designed for the most mission critical applications demanding the highest level of availability, the Hyper Historian delivers unparalleled performance with very efficient use of computer resources. This is the first plant historian to be certified for Microsoft Windows Vista™ and Microsoft Windows Server 2008, and includes tight integration with SQL Server 2005/2008. This technology makes Hyper Historian from ICONICS the best-in-class, real-time plant historian for any Microsoft 64-bit operating system.

Data storage and retrieval is faster than traditional relational databases and other real-time historians. Combining a high compression, advanced, Swinging Door algorithm, and designed from the ground up taking advantage of 64-bit hardware and software architectures, Hyper Historian can access more CPU power and memory than traditional 32-bit based historians, giving users the highest performance possible on all standard PC-based platforms.

Key features include:

- OPC-UA, DA and HDA Compliance
- Industry-standard Data Connectivity (SNMP, BACnet)
- Optimistic Concurrent Multi-user Configuration
    - Web-based Configuration and Administration
    - Unattended Data Archiving and Backup
- 2D and 3D Real-time Charts
- Real-time and Historical Data Replay
- Multiple Remote Data Collectors
- Store and Forward Technology
- Integration with ICONICS BizViz™ Manufacturing Intelligence Solutions
- SQL Interface to Obtain Historical Reports
- Diagnostic and Data Tracing with .NET Event Logs
- Integrated Redundancy

For mission critical applications that need uninterrupted access and collection of data, the ICONICS Hyper Historian has robust, built-in software redundancy. Automatic Store-and-Forward technology ensures data integrity, in the event there is a system failure or communications disruption.

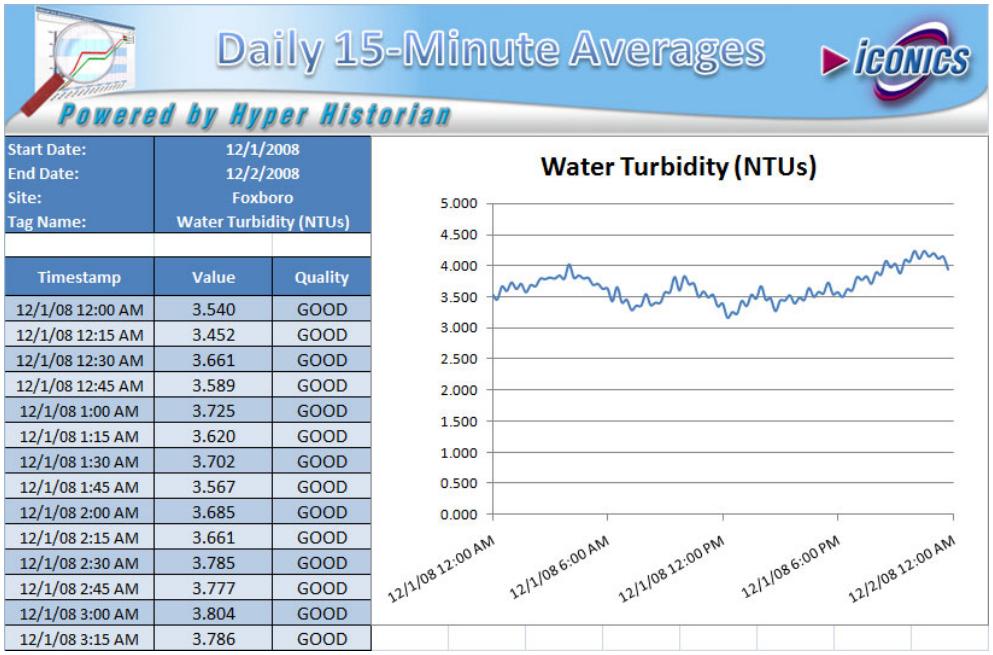
Hyper Historian uses advanced data integration, providing unsurpassed connectivity to any device via OPC-DA, OPC-UA, OPC-HDA, OPC XML, SNMP, BACnet or database values. Users can easily collect information from multiple plants, facilities and the enterprise. Data sources such as PLCs, I/O devices, HMI applications and network devices can be collected and stored for reporting and analytics.

Hyper Historian also includes an industry standard SQL query interface, enabling tight integration with any SQL compatible database such as Microsoft SQL Server 2005/2008, MySQL, Oracle and many others.

2.1 Gain Insight Into Your Historical Data with ICONICS' BizViz Suite

Bring your historical analysis to the next level by leveraging the data mining capabilities available within the ICONICS BizViz™ Manufacturing Intelligence/Business Visualization Suite to generate insightful reports and intelligent workflows. BizViz empowers decision makers at all levels of the enterprise with real-time and accurate information to help them drive global operational efficiency and strengthen competitive market advantage. BizViz provides real-time data aggregation, enables connectivity to multiple data sources, establishes manufacturing context with KPIs, and delivers manufacturing intelligence to the entire organization. Now, when users combine the power of BizViz with the flexible SQL query interface within ICONICS' Hyper Historian, they can realize a whole new realm of possibilities for analyzing their historical data.

ICONICS brings you the most advanced reporting and data orchestration tools available today, taking maximum advantage of Microsoft's most powerful technologies. ReportWorX™ and BridgeWorX™ are designed from the ground up based on Microsoft .NET and Microsoft Excel technologies. These revolutionary products integrate with any data source, such as Microsoft SQL Server, Microsoft Access, ODBC, OLEDB, MSDE, SAP, Oracle, AspenTech, OSI PI, SNMP, OPC HDA (Historical Data Access), OPC real-time information, and of course, ICONICS Hyper Historian, using powerful data mining technology.



ReportWorX pushes data into your report worksheets and controls the execution of Excel workbooks without the need for Excel to even be visible. BridgeWorX leverages its graphical workflow designer to move Hyper Historian data to another one of the many supported data sources, or vice versa. Together, these solutions lead you down the road of success.

3 Test Setup

3.1 Hardware

PC1 – Intel Pentium-D 2.0 GHz, 2GB RAM, Windows XP SP3
PC2 – AMD64 2x2.8GHz, 8GB RAM, Windows Server 2008 x64
PC3 – Intel64 Quad 2.4GHz, 8GB RAM, Windows Server 2008 x64
PC4 – AMD64 2x2.4GHz, 4GB RAM, Windows Server 2008 x64
PC5 – AMD64 2x2.4GHz, 4GB RAM, Windows Vista x64 SP1
PC6 – AMD64 2x2.4GHz, 4GB RAM, Windows Server 2008 x64
PC7 – Intel Core 2, 2GB RAM, Windows Vista x64 SP1

3.2 Software

a) ICONICS OPC Simulator 3.12 for the Steady state tests:
Digital Tags:
Ramp01 – Ramp50: 1000 tags each group changing every 1 second
Sine01 – Sine50: 1000 tags each group changing every 1 second
Random01 – Random50: 1000 tags each group changing every 1 second
String01 – String10: 1000 tags each group changing every 1 second
Step01 – Step50: 1000 tags each group changing every 1 second
Square01 – Square 50: 1000 tags each group changing every 1 second

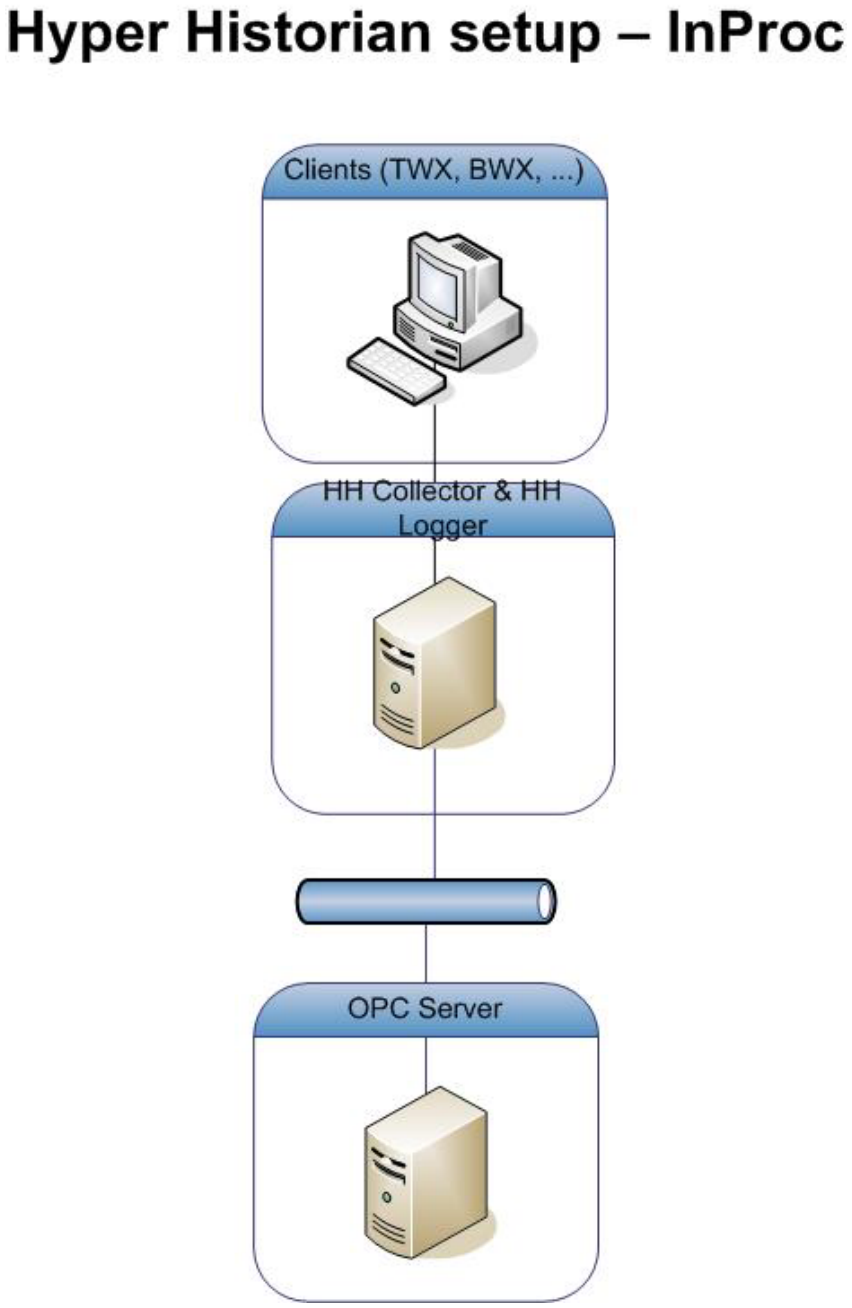
Boolean Tags:
Bool01 – Bool50: 1000 tags each group changing every 1 second
G18: 1000 tags each group changing every 1 second

b) ICONICS OPC Simulator 3.12 for the Burst state tests:
Digital Tags:
Ramp01 – Ramp150: 1000 static tags each group (there was special utility which was incrementally writing every 1 second into each of these static tags)

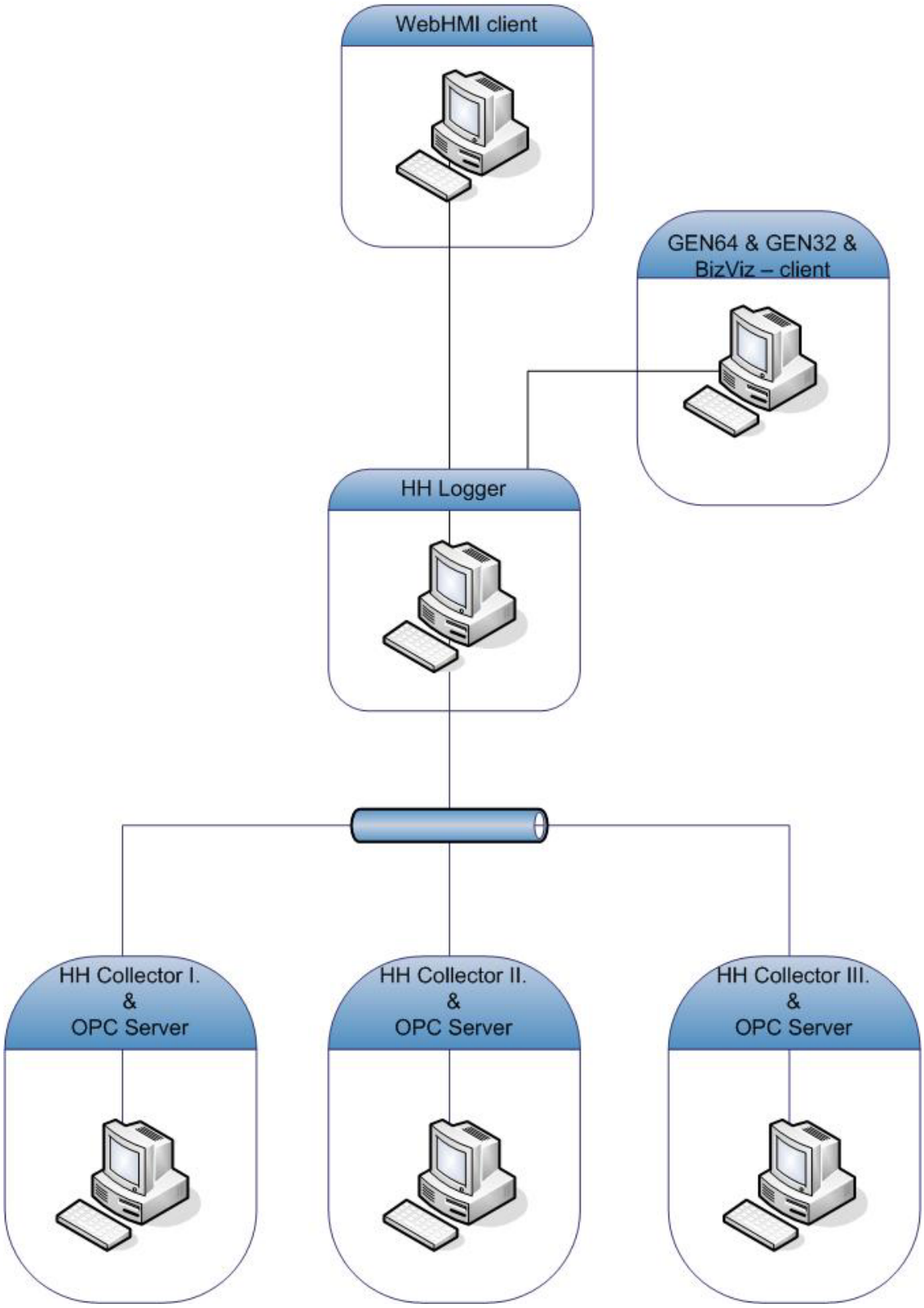
c) GENESIS64 10.01

3.3 System / Network Architecture

The following diagrams give an idea of the network setup when the remote Collectors (Out of Proc version) of Hyper Historian were tested. These tests were run during normal office hours to ensure normal network load conditions:



Hyper Historian setup – OutProc



3.4 Testing Methodology

There are two main test configurations that were utilized when testing the performance of Hyper Historian. The first test configuration is based on a centralized (single workstation) architecture where Hyper Historian Standard edition is used to provide a single-box solution. The Hyper Historian in this case communicates to a remote data source (OPC Server). The second test configuration is based on a de-centralized (distributed collector) system where the Hyper Historian data collectors are remotely located on the machines containing the IO (OPC) Servers.

Tests were run to measure the performance of Hyper Historian. The tables in Section 4 give the results of the various combinations of number tags, the rate at which tags change and the number of clients that were used.

GraphWorX64™ with TrendWorX Viewer 64™ and HH SQL Interface are considered to be clients in most of the cases. These applications are used to check that the data was being logged.

In both test configurations, the data is obtained from remote OPC Servers. In both cases, the Hyper Historian logs the data to files that are local to the Hyper Historian Logger (that is, the Hyper Historian data files located on the same machine on which the Hyper Historian Logger is running).

The CPU usage and Memory usage were obtained from the Windows Performance Monitor, Process Explorer and from Windows Task Manager.

All test cases were performed on Hyper Historian Version 10.01. The steady state throughput benchmark tests were performed minimally for one hour, but many were run for longer periods of time (several hours to several days).

During the testing, hardware keys were used for licensing the Hyper Historian, in most cases. In some early test cases, specially edited DLLs with unlimited tags (and a time expiration) were used. However, this special license DLL should not have any impact on the performance of Hyper Historian or on the test results.

4 Tests and Results

4.1 Hyper Historian Standard Edition

The Standard Edition of the Hyper Historian uses an "InProc" or in-process version of the Hyper Historian Logger and Hyper Historian Collector. To run in-process, both the Logger and the Collector must reside and run on the same machine. As a result, they are able to communicate and transfer data with minimal overhead.

The advantage of this scenario is that there are no communication delays between the Collector and the Logger. However, this scenario places bigger requirements on the hardware; the merged Collector and Logger share the RAM memory and the CPU.

The results of three general test cases on Hyper Historian Standard Edition are provided. The first two test cases test the steady state throughput of Hyper Historian. In each of these test cases, Hyper Historian was run anywhere from several hours to several days for each of the data collection rates given in the test cases. The first test case was run on a Dual Core machine. The second test case was run on a Quad Core machine.

The third test case tests the burst throughput capabilities of Hyper Historian. In each of these tests, higher than normal data collection rates are used for periods of time ranging from 1 second to 10 minutes.

4.1.1 Test Case I – Steady State Throughput on Dual Core, Std. Edition

4.1.1.1 Specifications

- AMD Athlon X2 64 Dual Core Processor 5200+ 2.86 GHz
- 8 GB RAM
- 8 GB Virtual Memory
- ATI Radeon HD 2600 PRO
- Windows Vista Business x64 SP1
- Microsoft SQL Server 2005 x64 SP2
- In Proc version

4.1.1.2 Tag Information

- Tag count (total) = varies by test case (all from the ICONICS OPC Simulator 3.12)
- Update rate – varies by test case
- Tag data types:
  - 20 % in all test cases were Booleans - DIGITALS
  - 80 % in all test cases were 32-bit Floats (simulations of Ramps, Random values, and Sine signals) - ANALOGS

4.1.1.3 Logging Information

- Data Collection rate = Varies by test case
- Shadow Flush Time = 300 seconds
- Data Cache Size = 125 - 1250 MB (varies by test case)
- Index Cache Size = 75 - 800 MB (varies by test case)

4.1.1.4 Archiving Information

- 2-hour archive block duration
- Max File Time Extent: 1 hour
- Min Storage time: 2 hours

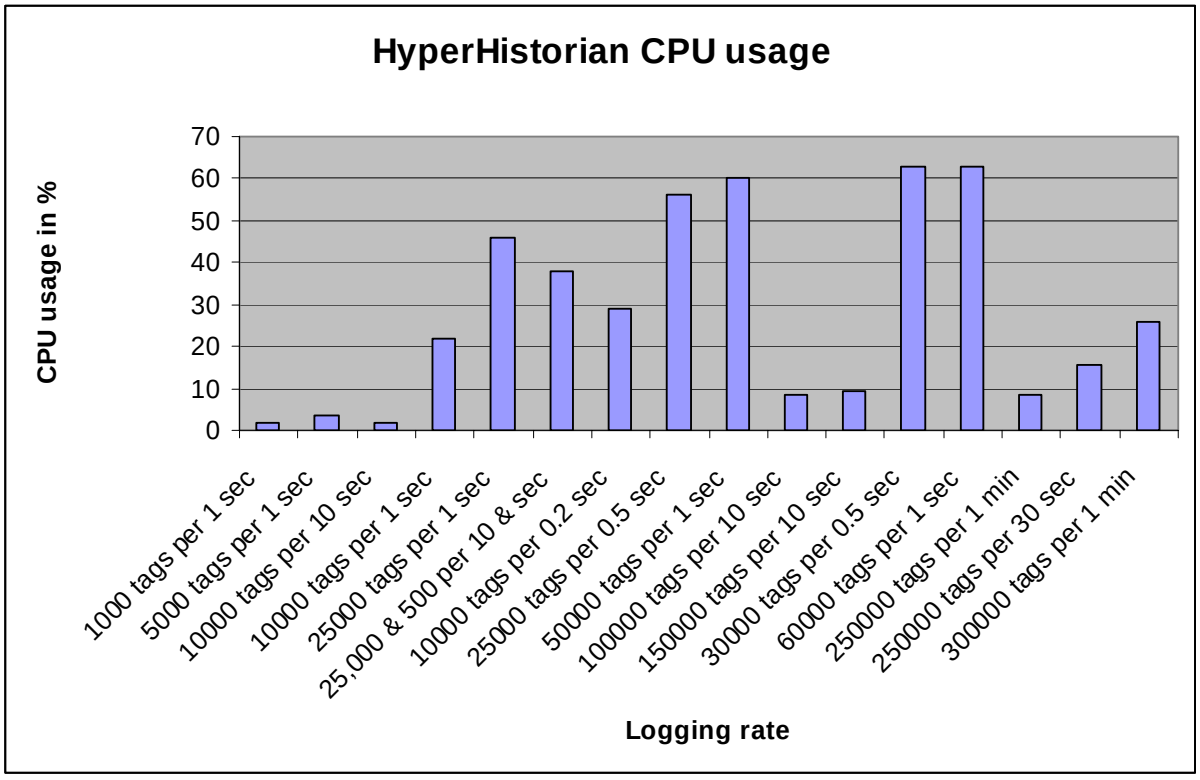
4.1.1.5 Query Load

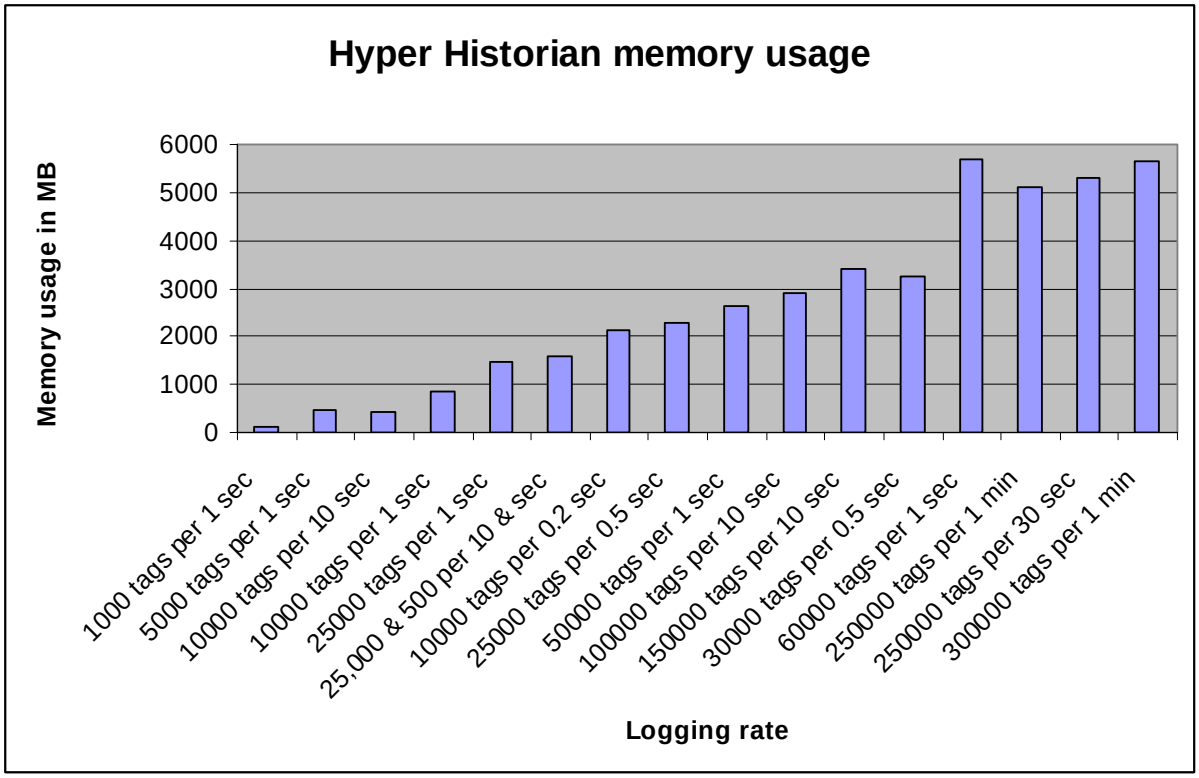
- Replaying 10 trends in TWXViewer64
  - Live mode – 1 second update
  - 1 hour duration
  - 10 tags (3 booleans, 4 ramps, 2 randoms and 1 sine)

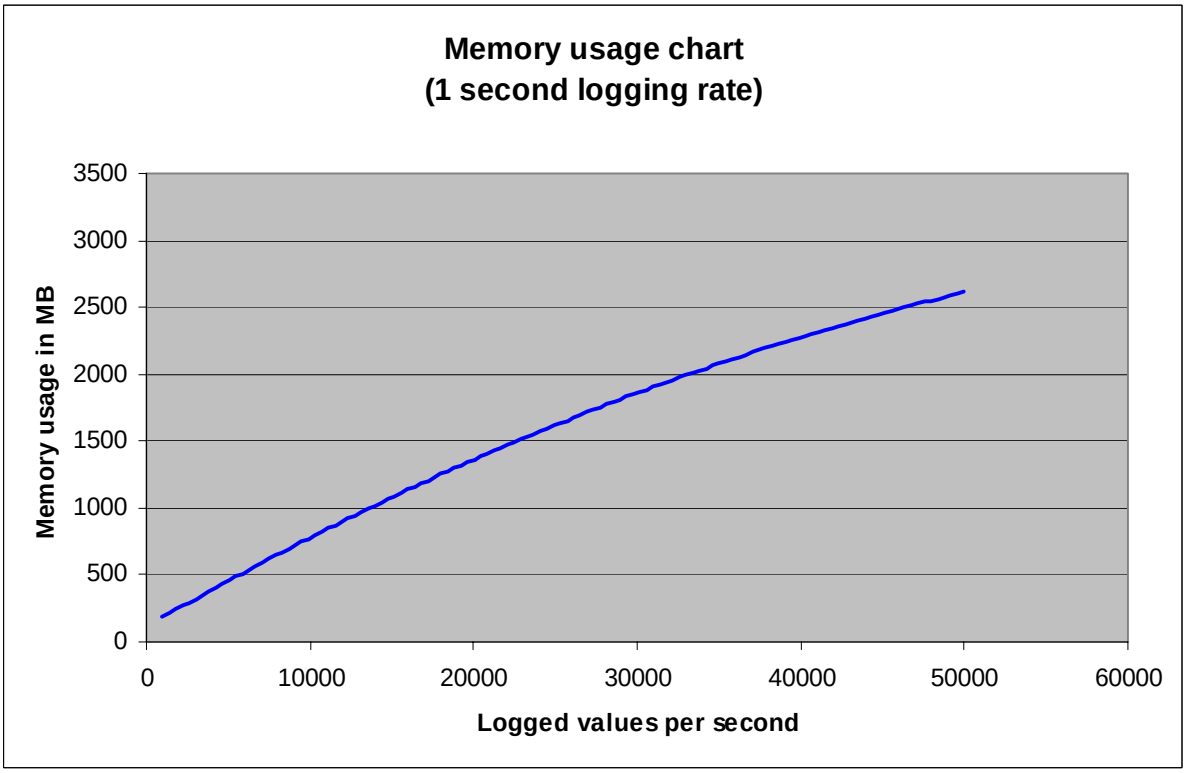
4.1.1.6 Performance Results

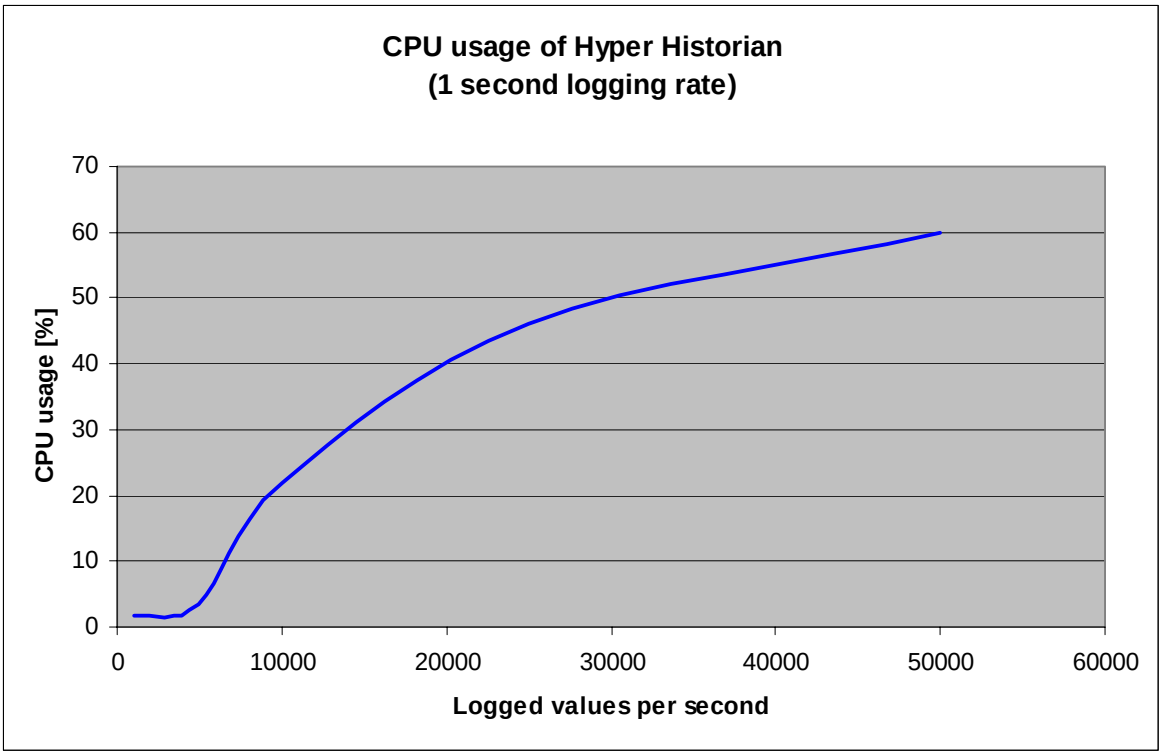
Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
1,000 values logged every second	1.8	133	1,000
10,000 values logged every 10 seconds	3.4	450	1,000
5,000 values logged every second	3.0	450	5,000
10,000 values logged every 1 second	22.0	860	10,000
100,000 values logged every 10 seconds	8.0	2,920	10,000
150,000 values logged every 10 seconds	9.5	3,400	15,000
25,000 values logged every 1 second	46.0	1,480	25,000
10,000 values logged every 200 milliseconds	29.0	2,120	50,000
25,000 values logged every 500 milliseconds	56.0	2,275	50,000
50,000 values logged every 1 second	60.0	2,630	50,000
250,000 values logged every 60 seconds	8.4	5,100	4,160
300,000 values logged every 60 seconds	26.0	5,650	5,000
250,000 values logged every 30 seconds	15.5	5,300	8,333

4.1.1.7 Performance Charts









4.1.2 Test Case II – Steady State Throughput on Quad Core with various tag data types, Std Edition

4.1.2.1 Specifications

- Intel Quad 2.4 GHz
- 8 GB RAM
- 8 GB Virtual Memory
- ATI Radeon HD 2600 PRO
- Windows Server 2008 x64
- Microsoft SQL Server 2005 x64 SP2
- InProc Version

4.1.2.2 Tag Information

- Tag count = varies by test case (all from the ICONICS Simulator 3.12)
- Update rate – 1 second
- Tag data types = varies by test case
  - Test case I. – 100 % digitals (Booleans changing every 1 second)
  - Test case II. – 80 % digitals and 20 % analogs (32-bit Floats; simulations of ramps)
  - Test case III. – 50 % digitals and 50 % analogs
  - Test case IV. – 20 % digitals and 80 % analogs
  - Test case V. – 100 % analogs

4.1.2.3 Logging Information

- Data Collection rate = 10 seconds
- Shadow Flush Time = 600 seconds
- Data Cache Size – varies by test case (number of logged values/40) [MB]
- Index Cache Size – varies by test case (number of logged values/75) [MB]

4.1.2.4 Archiving Information

- 2-hour archive block duration
- Max File Time Extent: 2 hours
- Min Storage time: 2 hours

4.1.2.5 Query Load

- Replaying 10 trends in TWXViewer64
- Live mode – 1 second update
- 1 hour duration
- 10 tags – varies by test case

4.1.2.6 Performance Results

4.1.2.6.1 Test Case I. – 100% digitals

Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
10,000 per second	5.6	815	10,000
20,000 per second	11.2	1,420	20,000
30,000 per second	15.9	2,600	30,000
40,000 per second	24.9	2,860	40,000
50,000 per second	30.5	3,790	50,000

4.1.2.6.2 Test Case II. – 80% digitals and 20% analogs

Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
10,000 per second	5.6	785	10,000
20,000 per second	11.4	1,345	20,000
30,000 per second	18.3	2,070	30,000
40,000 per second	25.4	2,765	40,000
50,000 per second	32.5	3,610	50,000

4.1.2.6.3 Test Case III. – 50% digitals and 50% analogs

Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
10,000 per second	5.3	1,105	10,000
20,000 per second	10.7	1,650	20,000
30,000 per second	18.4	1,910	30,000
40,000 per second	25.9	2,520	40,000
50,000 per second	33.5	3,300	50,000

4.1.2.6.4 Test Case IV. – 20% digitals and 80% analogs

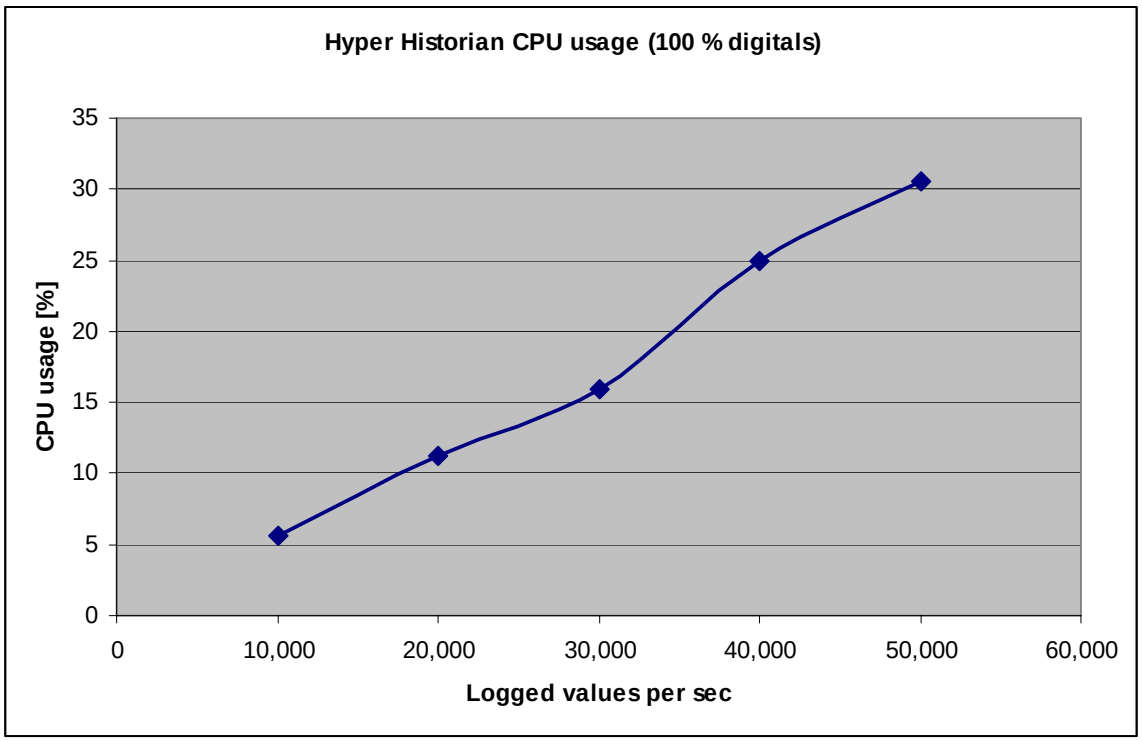
Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
10,000 per second	5.9	745	10,000
20,000 per second	12.2	1,210	20,000
30,000 per second	18.4	1,775	30,000
40,000 per second	24.4	2,345	40,000
50,000 per second	34.5	3,185	50,000

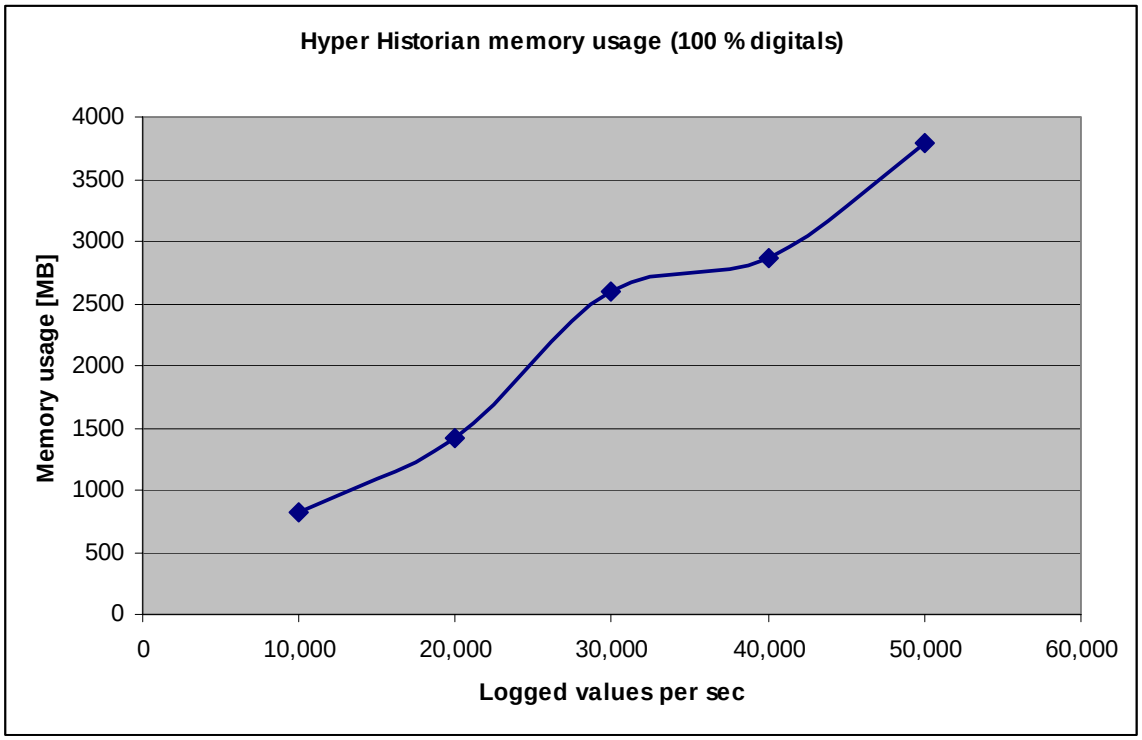
4.1.2.6.5 Test Case V. – 100% analogs

Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
10,000 per second	5.8	790	10,000
20,000 per second	12.1	1190	20,000
30,000 per second	19.1	1670	30,000
40,000 per second	27.0	2,360	40,000
50,000 per second	35.7	3,485	50,000

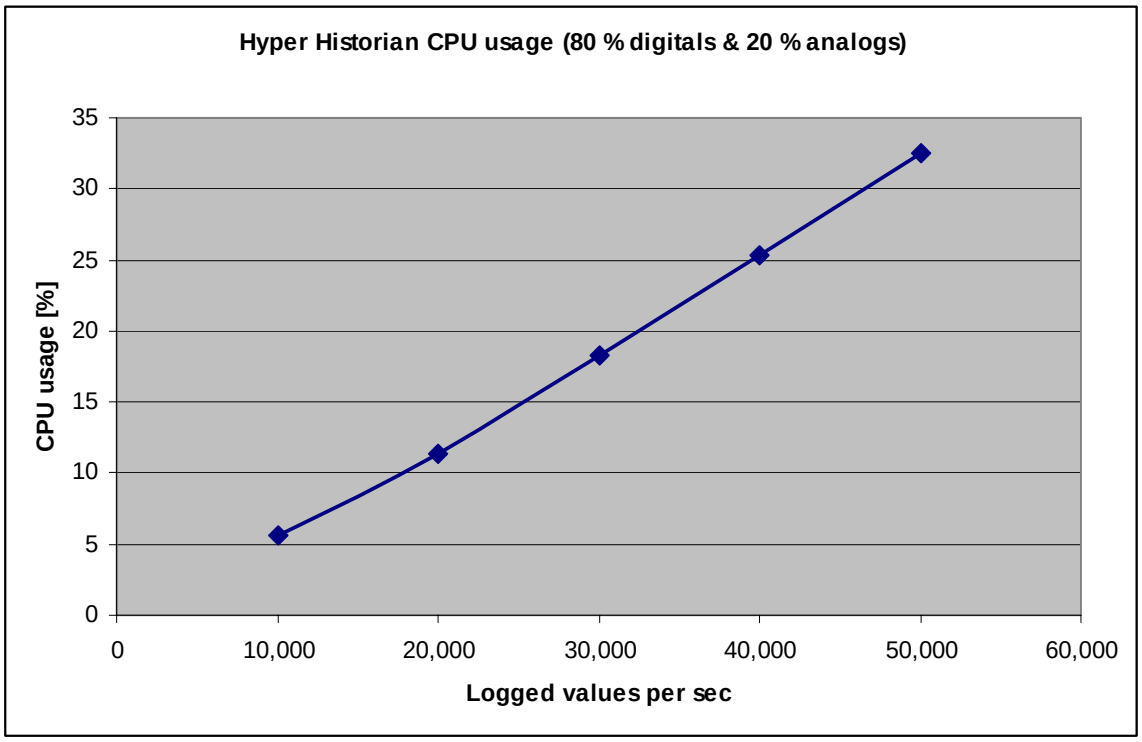
4.1.2.7 Performance Charts

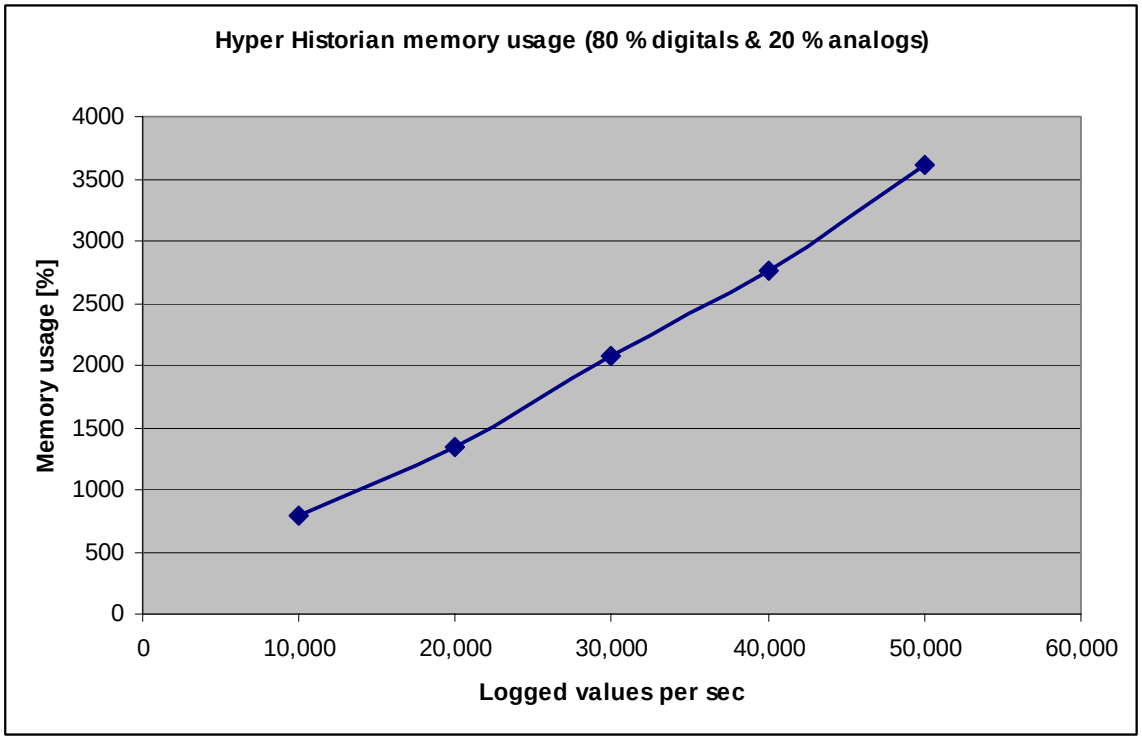
4.1.2.7.1 Test Case I. – 100% digitals



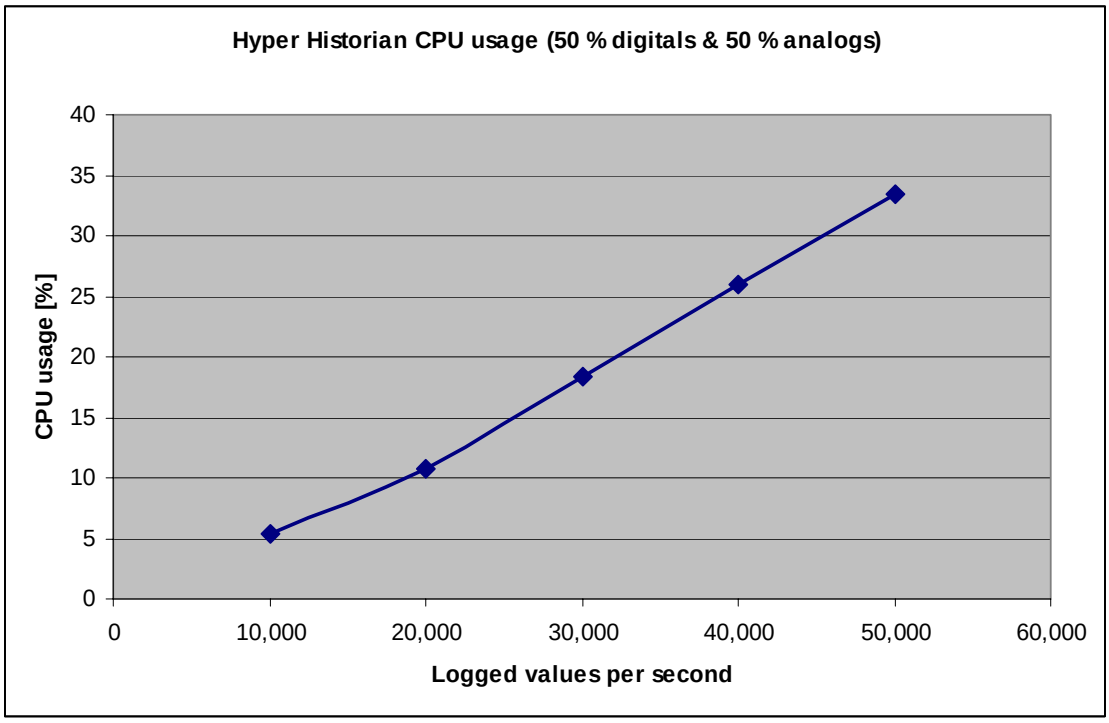


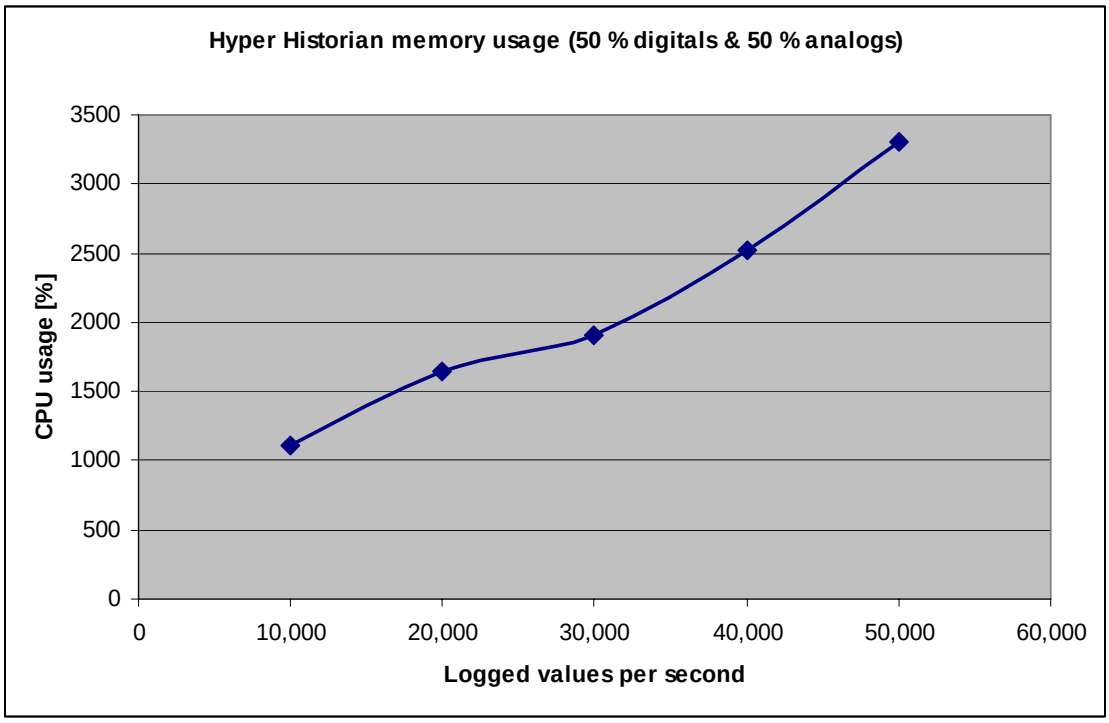
4.1.2.7.2 Test Case II. – 80% digitals and 20% analogs



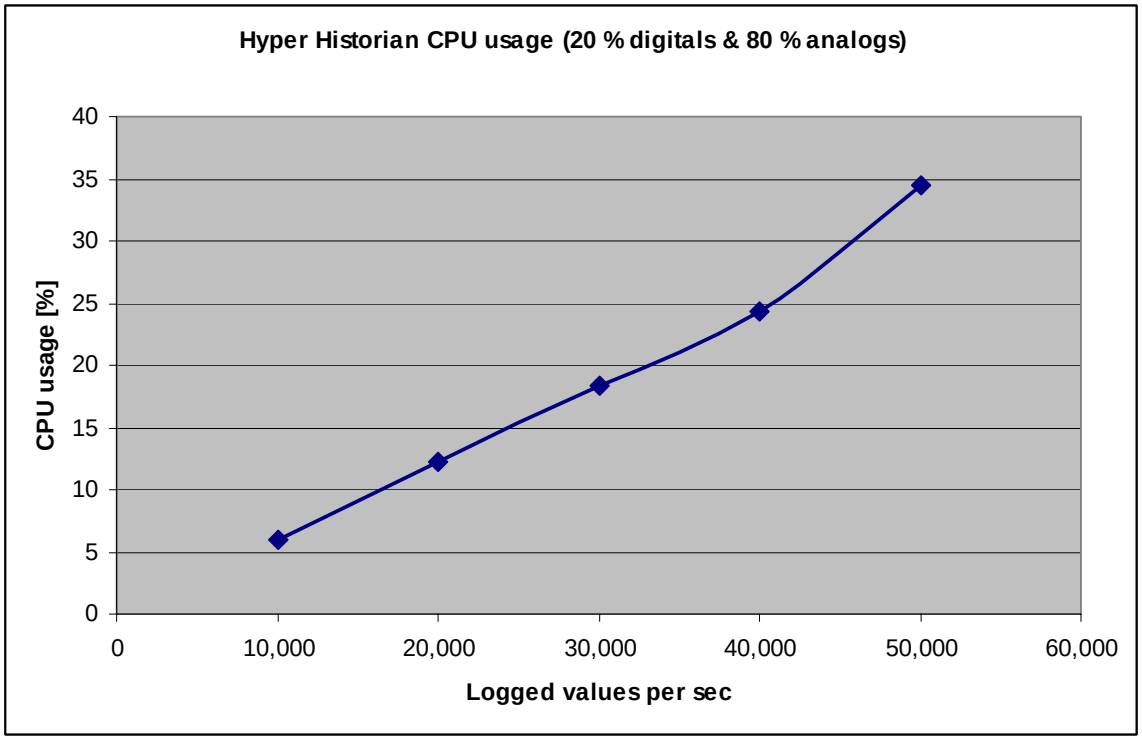


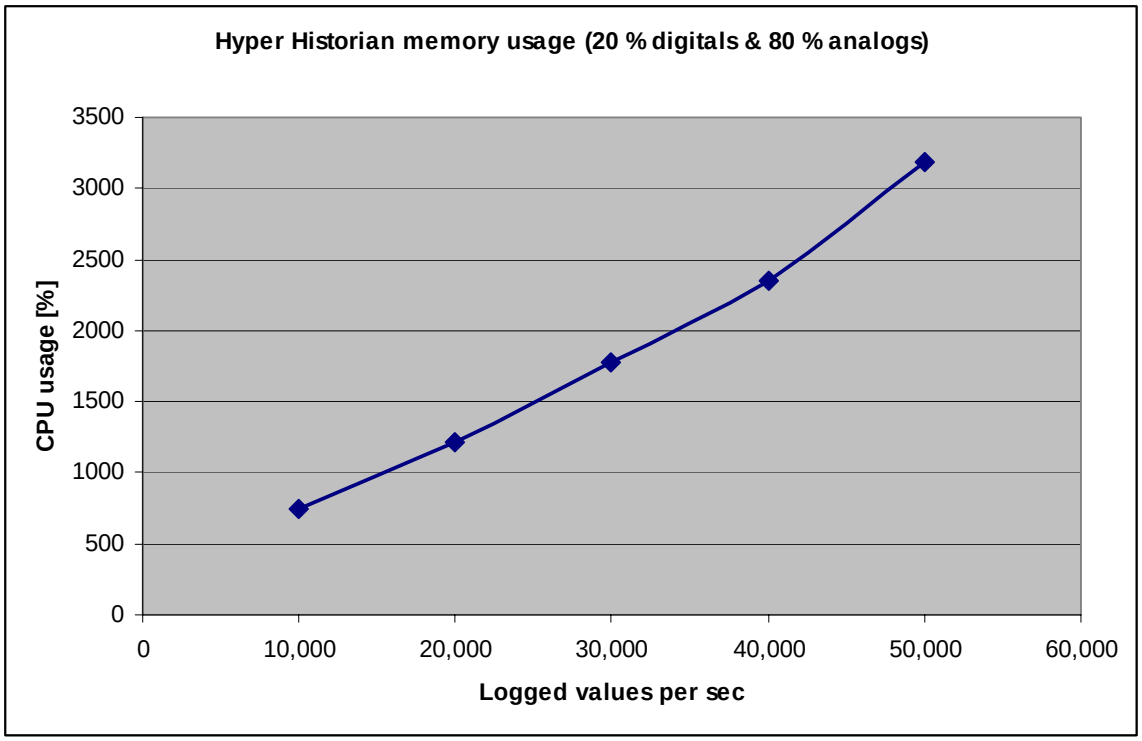
4.1.2.7.3 Test Case III. – 50% digitals and 50% analogs



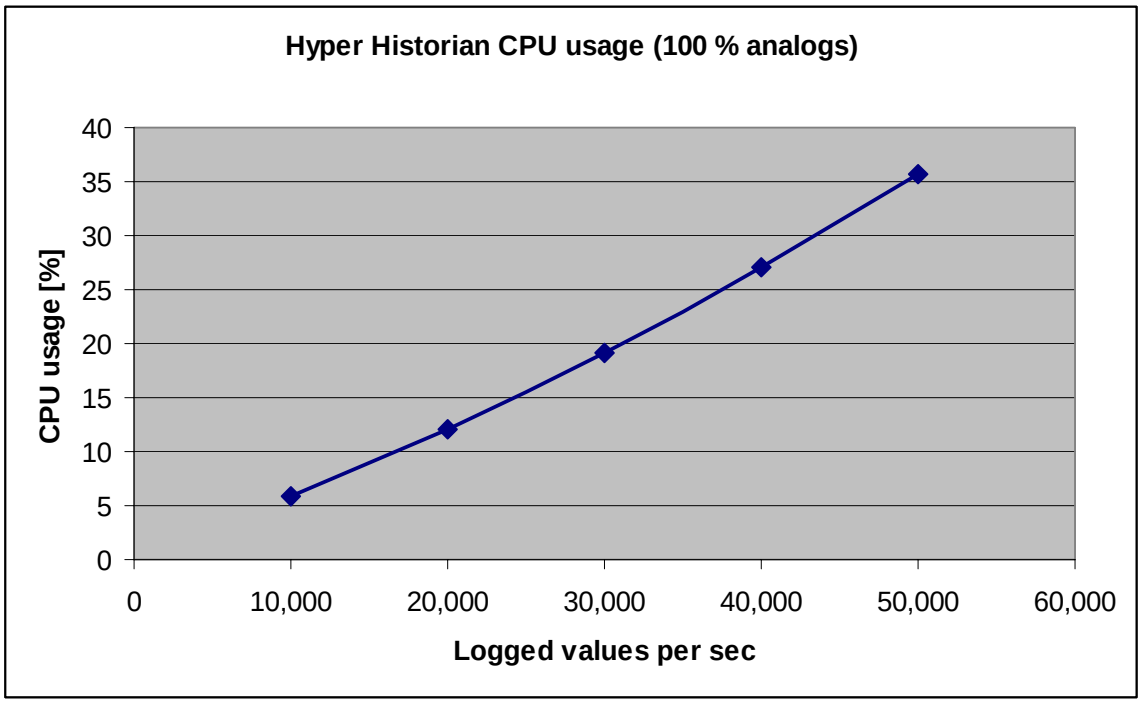


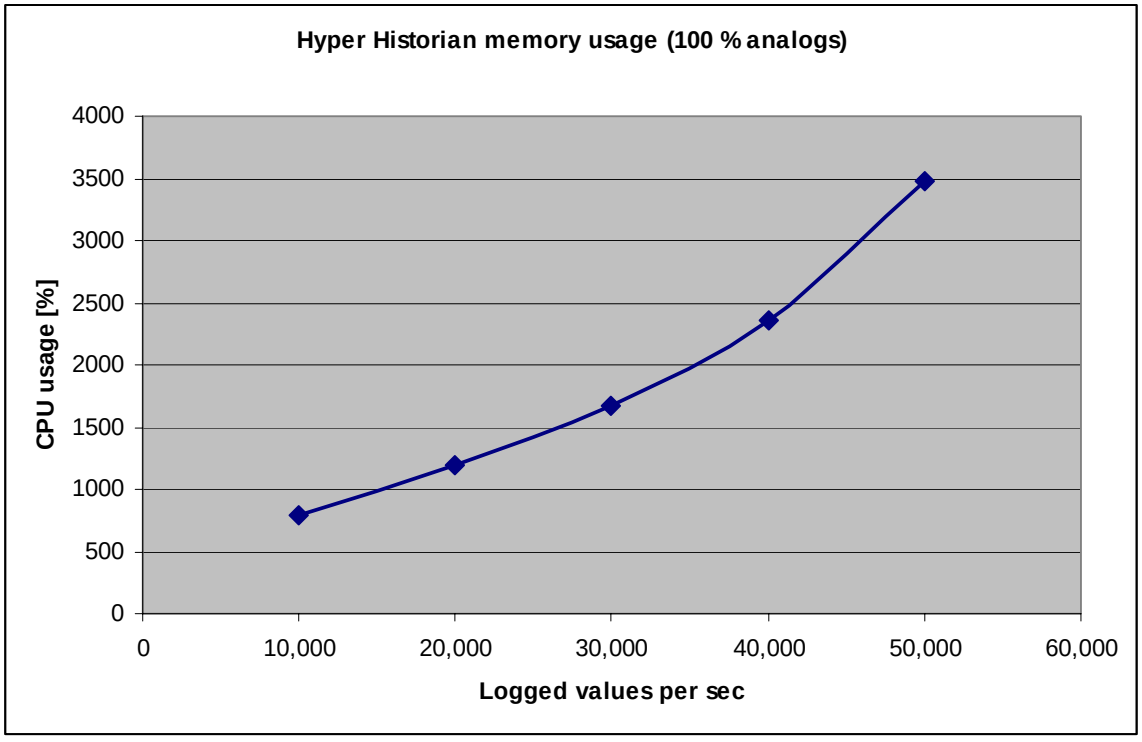
4.1.2.7.4 Test Case IV. – 20% digitals and 80% analogs





4.1.2.7.5 Test Case V. – 100% digitals





4.1.3 Test Case III – Steady State Throughput on Quad Core, Std Edition

4.1.3.1 Specifications

- ☐ Intel Quad 2.4 GHz
- ☐ 8 GB RAM
- ☐ 8 GB Virtual Memory
- ☐ ATI Radeon HD 2600 PRO
- ☐ Windows Server 2008 x64
- ☐ Microsoft SQL Server 2005 x64 SP2
- ☐ In Proc version

4.1.3.2 Tag Information

- ☐ Tag count (total) = varies by test case (all from the ICONICS OPC Simulator 3.12)
- ☐ Update rate – 1 second
- ☐ Tag data types:
  - 100 % were 32-bit Floats (simulations of Ramps, Random values, and Sine signals) - ANALOGS

4.1.3.3 Logging Information

- ☐ Data Collection rate = varies by test case
- ☐ Shadow Flush Time = 600 seconds
- ☐ Data Cache Size = 1500 MB
- ☐ Index Cache Size = 800 MB

4.1.3.4 Archiving Information

- ☐ 2-hour archive block duration
- ☐ Max File Time Extent: 1 hour
- ☐ Min Storage time: 2 hours

4.1.3.5 Query Load

- ☐ Replaying 10 trends in TWXViewer64
  - Live mode – 1 second update
  - 1 hour duration
  - 10 tags (3 booleans, 4 ramps, 2 randoms and 1 sine)

4.1.3.6 Performance Results

Test Case	Hyper Historian CPU [%]	Hyper Historian RAM [MB]	Values Logged per Second
50,000 values logged every 1 second	32.0%	2980	50,000
55,000 values logged every 1 second	33.0%	3780	55,000
60,000 values logged every 1 second	36.0%	3870	60,000

4.1.4 Test Case IV – Burst Throughput on Quad Core, Std Edition

4.1.4.1 Specifications

- ☐ Intel Quad 2.4 GHz
- ☐ 8 GB RAM
- ☐ 8 GB Virtual Memory
- ☐ ATI Radeon HD 2600 PRO
- ☐ Windows Server 2008 x64
- ☐ Microsoft SQL Server 2005 x64 SP2
- ☐ In Proc version

4.1.4.2 Tag Information

- ☐ Tag count (total) = varies by test case (all from the ICONICS OPC Simulator 3.12)
- ☐ Update rate – varies by test case
- ☐ All of the tags used in this test case were 32-bit Floats – ANALOGS

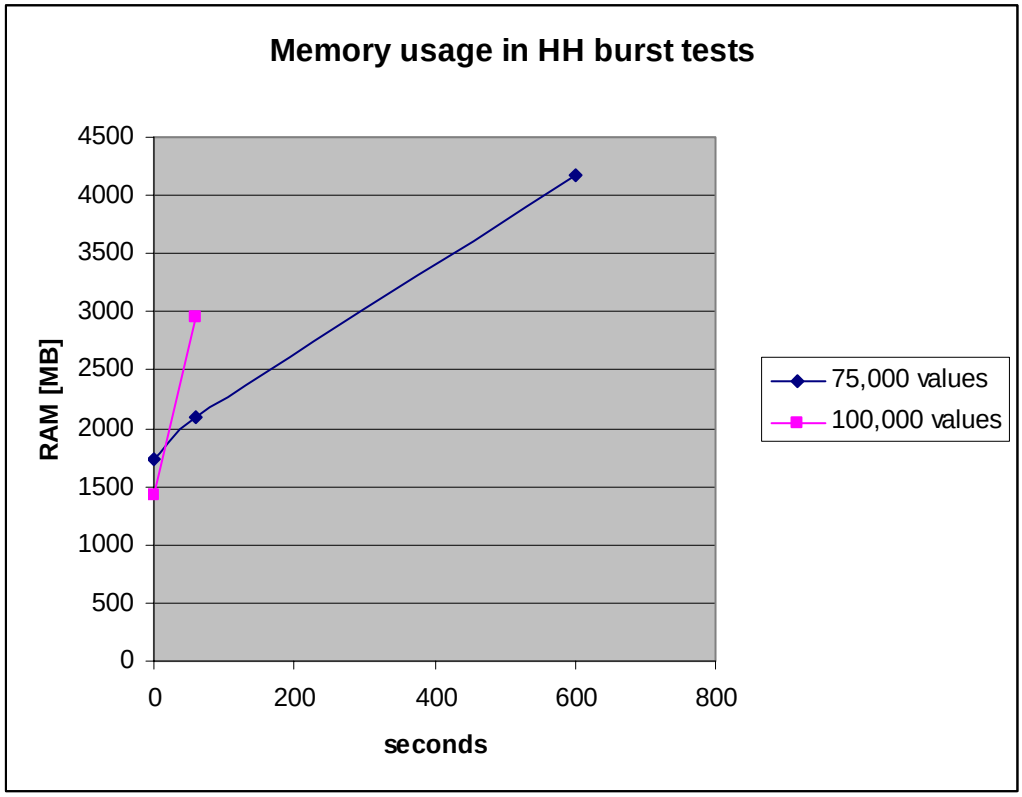
4.1.4.3 Logging Information

- ☐ Data Collection rate = 1 second
- ☐ Shadow Flush Time = 600 seconds
- ☐ Data Cache Size = 1900 - 2500 MB (varies by test case)
- ☐ Index Cache Size = 900 - 1300 MB (varies by test case)

4.1.4.4 Performance Results

Test Case	Number of Seconds	Hyper Historian RAM [MB]	Test Result
75,000 values logged every second	1 second	1735	Pass
75,000 values logged every second	60 seconds	2100	Pass
75,000 values logged every second	600 seconds	4180	Pass
100,000 values logged every second	1 second	1430	Pass
100,000 values logged every second	60 seconds	2950	Pass

4.1.4.5 Performance Chart



4.2 Hyper Historian Enterprise Edition

Hyper Historian Enterprise Edition uses out-of-process (OutProc) versions of the Hyper Historian Collector and Hyper Historian Logger. By running out-of-process, the Hyper Historian Collector can be separated from the Logger, allowing it to be installed and run on a remote machine, and in a typical scenario, on the machine containing the I/O (OPC DA) Server. The Enterprise (out-of-process) versions of the Hyper Historian Collector and Logger use OPC-UA Communications to pass information and data.

The advantage of this scenario is that the data collection can be distributed. It can result in higher data throughput and a more reliable system. Higher throughput is achieved by distributing the processing required for the data collection. Higher reliability is achieved via the Store and Forward feature built into the Hyper Historian Collector and the optional redundancy features.

The results of two general test cases on Hyper Historian Enterprise Edition are provided. The first test case tests the steady state throughput of Hyper Historian. In this test case, Hyper Historian was run for several hours for each of the data collection rates given in the test cases.

The second test case tests the burst throughput capabilities of Hyper Historian. In each of these tests, higher than normal data collection rates are used for periods of time ranging from 1 second to 10 minutes.

4.2.1 Test Case I – Steady State Throughput on Quad Core, Ent. Ed.

4.2.1.1 Specifications

- ☐ Intel Quad 2.4 GHz
- ☐ 8 GB RAM
- ☐ 8 GB Virtual Memory
- ☐ ATI Radeon HD 2600 PRO
- ☐ Windows Server 2008 x64
- ☐ Microsoft SQL Server 2005 x64 SP2
- ☐ In Proc version

4.2.1.2 Tag Information

- ☐ Tag count (total) = 50,000 – 25,000 per Collector (all from the ICONICS OPC Simulator 3.12)
- ☐ Update rate – varies by test case
- ☐ Tag data types:
  - 70 % in all test cases were 32-bit Floats - ANALOGS
    - 25,000 ramp signals (update rate 200 ms)
    - 5,000 random values (update rate 200 ms)
    - 5,000 sine signals (update rate 200 ms)
  - 30 % in all test cases were Booleans - DIGITALS
    - 15,000 booleans (switching period every 1 second)

4.2.1.3 Logging Information

- ☐ Data Collection rate = 1 second
- ☐ Shadow Flush Time = 600 seconds
- ☐ Data Cache Size = 1250 MB
- ☐ Index Cache Size = 700 MB

4.2.1.4 Archiving Information

- ☐ 2-hour archive block duration
- ☐ Max File Time Extent: 1 hour
- ☐ Min Storage time: 2 hours

4.2.1.5 Query Load

- ☐ Replaying 10 trends in TWXViewer64
  - Live mode – 1 second update
  - 1 hour duration
  - 10 tags (3 booleans, 4 ramps, 2 randoms and 1 sine)

4.2.1.6 Performance Results

4.2.1.6.1 50,000 changes per second (one local and two remote Collectors)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	50,000 values / 1 sec	38	2825	50,000
Local Collector – PC2	30,000	8	625	
Remote Collector – PC4	10,000	2.5	325	
Remote Collector - PC3	10,000	4	475	

4.2.1.6.2 50,000 changes per second (one local Collector)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	50,000 values / 1 sec	36	2900	50,000
Local Collector – PC2	50,000	30	1325	

4.2.1.6.3 30,000 changes per second (two remote Collectors)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	30,000 values / 1 sec	25,5	2600	30,000
Remote Collector – PC4	15,000	5.5	510	
Remote Collector - PC3	15,000	6	540	

4.2.1.6.4 40,000 changes per second (two remote Collectors)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	40,000 values / 1 sec	33	2780	40,000
Remote Collector – PC4	20,000	8	620	
Remote Collector - PC3	20,000	7.5	635	

4.2.1.6.5 50,000 changes per second (two remote Collectors)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	50,000 values / 1 sec	45,5	2800	50,000
Remote Collector – PC4	25,000	13.5	985	
Remote Collector - PC3	25,000	8.5	975	

4.2.1.6.6 50,000 changes per second (one remote Collector)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	50,000 values / 1 sec	25,5	2700	50,000
Remote Collector – PC4	50,000	15	850	

4.2.1.6.7 40,000 changes per second (one local and three remote Collectors)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	40,000 values / 1 sec	46	3100	40,000
Local Collector – PC2	10,000	5	540	
Remote Collector – PC3	10,000	4	400	
Remote Collector – PC4	10,000	4.5	490	
Remote Collector – PC5	10,000	6	560	

4.2.1.6.8 50,000 changes per second (one remote Collector)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	10,000 values / 200 msec	14	2020	50,000
Remote Collector – PC4	10,000	8	520	

4.2.1.6.9 40,000 changes per second (one remote Collector)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC2	20,000 values / 500 msec	13	2035	40,000
Remote Collector - PC3	20,000	10	640	

4.2.1.6.10 10,000 changes per second (one local Collector – STRINGS)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC4	10,000 values / 1 sec	25,5	1950	10,000
Local Collector – PC4	10,000	35	595	

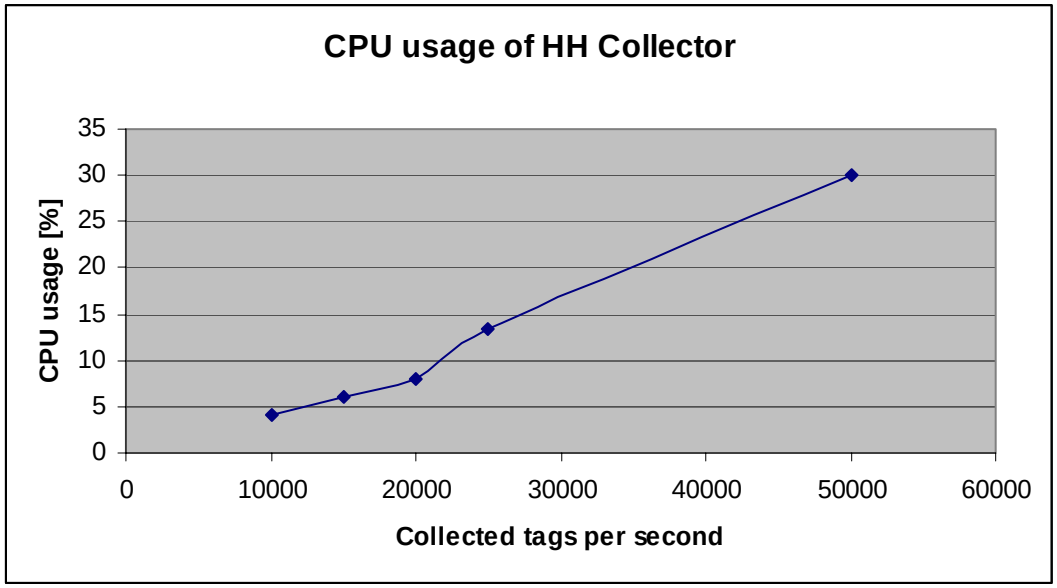
- Logging only STRING values. 5,000 tags were random strings from 1 to 25 characters. Another 5,000 tags were strings from 3 to 5 characters

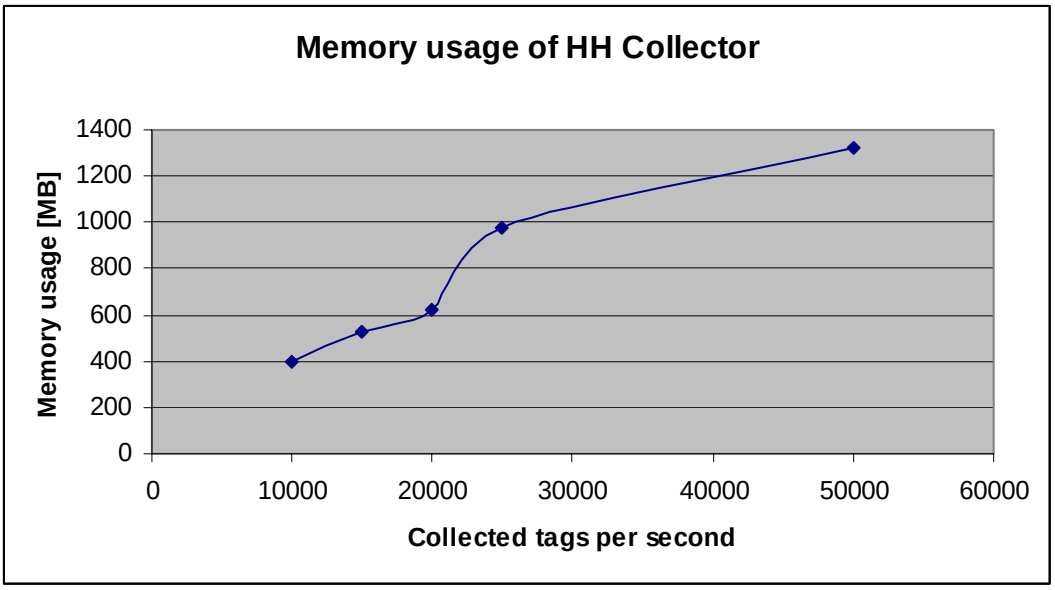
4.2.1.6.11 20,000 changes per second (one local Collector – STRINGS)

Module	Test Case	Avg. CPU [%]	Avg. RAM [MB]	Values Logged per Second
HH Logger – PC4	10,000 values / 500 msec	26	1890	20,000
Local Collector – PC4	10,000	36	545	

- Logging only STRING values. 5,000 tags were random strings from 1 to 25 characters. Another 5,000 tags were strings from 3 to 5 characters

4.2.1.7 Performance Charts





4.2.2 Test Case II – Burst Throughput on Quad Core, Ent. Edition

4.2.2.1 Specifications

- Intel Quad 2.4 GHz
- 8 GB RAM
- 8 GB Virtual Memory
- ATI Radeon HD 2600 PRO
- Windows Server 2008 x64
- Microsoft SQL Server 2005 x64 SP2
- In Proc version

4.2.2.2 Tag Information

- Tag count (total) = varies by test case (all from the ICONICS OPC Simulator 3.12)
- Update rate – varies by test case
- All of the tags used in this test case were 32-bit Floats - ANALOGS

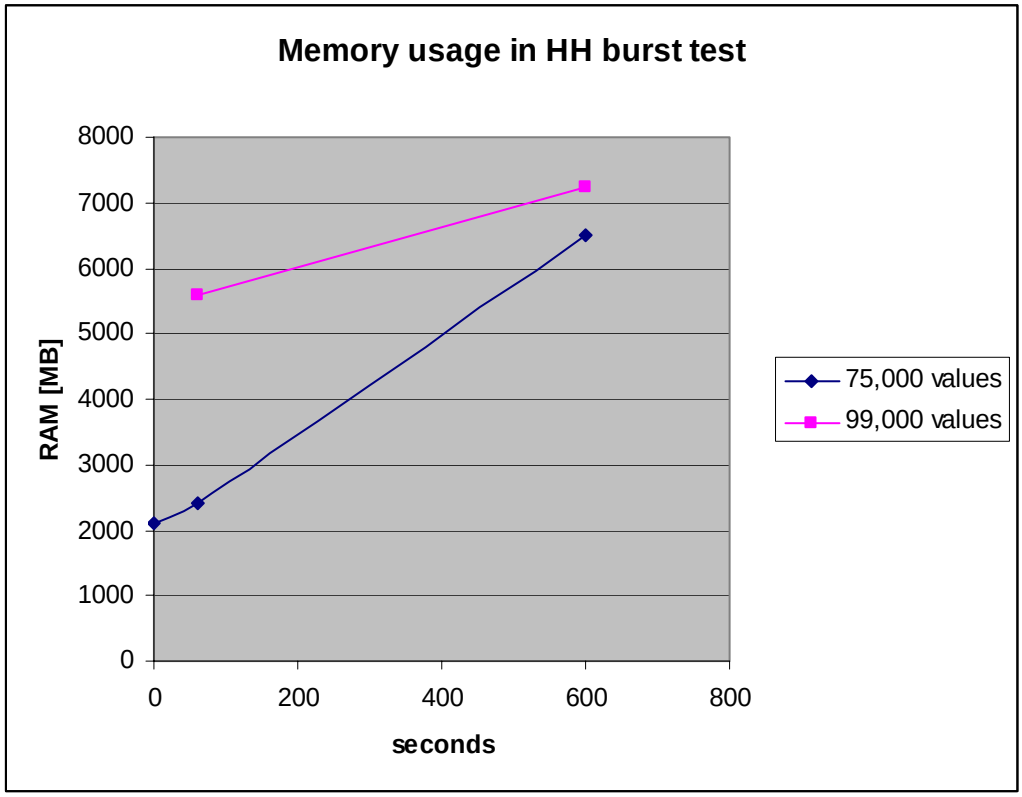
4.2.2.3 Logging Information

- Data Collection rate = 1 second
- Shadow Flush Time = 300 seconds
- Data Cache Size = 1250 MB
- Index Cache Size = 700 MB

4.2.2.4 Performance Results

Test Case	Number of Seconds	Hyper Historian RAM [MB]	Test Result
75,000 values logged every second	1 second	2100	Pass
75,000 values logged every second	60 seconds	2400	Pass
75,000 values logged every second	600 seconds	6500	Pass
99,000 values logged every second	60 seconds	5600	Pass
99,000 values logged every second	600 seconds	7250	Pass

4.2.2.5 Performance Chart



5 Summary

The results of the Hyper Historian Steady State Benchmark Tests demonstrate that both versions of Hyper Historian (Standard and Enterprise) can log a *minimum* of 50,000 values per second in steady state operation. Both editions of the Hyper Historian are capable of logging substantially more values per second if they are run on more powerful machines, since the Hyper Historian will scale up to fully utilize all of the hardware that is allocated to it.

The results of the Hyper Historian Burst Logging Benchmark Tests demonstrate that both versions of Hyper Historian (Standard and Enterprise) can log approximately 100,000 values per second under burst conditions. The Standard version was able to log 100,000 values per second continuously over a period of one minute, while Hyper Historian Enterprise Version was able to log about 100,000 values per second continuously over a period of 10 minutes.

With the introduction of such a high performance data historian into the market, ICONICS is encouraging its user base to take advantage of the true power of 64-bit computing. When combined with manufacturing intelligence products such as ReportWorX and BridgeWorX for advanced data mining and analysis, this opens up a whole new realm of possibilities for process improvement and operational excellence.

For more details on the ICONICS BizViz manufacturing intelligence suite of products and how it can help you drive improvements to your bottom line, please visit www.iconics.com/products/bizviz_suite.asp.

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