



TrendWorX32 Logger – Best Practices for Data Logging Load Distribution



APPLICATIONS NOTE

October 2013

Description: Guide to configure your TrendWorX32 data logger for best performance.

OS Requirement: Windows XP / Windows Vista / Windows 7 / Windows 8 / Windows Server 2003 / Windows Server 2008 / Windows Server 2008 R2 / Windows Server 2012

General Requirement: N/A

Introduction

The TrendWorX32 product collects process data and logs this into standard databases (Access, MSDE, MS-SQL, Oracle, etc.). TrendWorX32 Logger is an OPC Data Access Client (v1.x, v2.x, v3.x), collecting data from the DA server according to your customized logger configuration. Once there is data, TrendWorX32 OPC HDA server can return logged data for reporting purposes or for live presentation on the screen.

You can configure the TrendWorX32 Logger to write data to Microsoft Access, Microsoft Desktop Engine (MSDE), Microsoft SQL Server, MySQL and Oracle.

Depending on the need of your organization, you can choose different types of databases to log your data. Please keep in mind the size limitation of each type of database and the management capabilities provided when you are choosing the database type. You can refer to Table 1 for more information on each of the different databases.

Table 1 - Database Types

DB Type	Max DB Size	GUI for DB Management
Access	750 MB	Yes
MSDE 2000	2 GB	No
SQL Express 2005	4 GB	Yes
SQL Express 2008	4 GB	Yes
SQL Express 2008R2	10 GB	Yes
SQL Express 2012	10 GB	Yes
SQL Server 2000	Limited by hard disk	Yes
SQL Server 2005	Limited by hard disk	Yes
SQL Server 2008	Limited by hard disk	Yes
SQL Server 2008R2	Limited by hard disk	Yes
SQL Server 2012	Limited by hard disk	Yes
MySQL	Limited by hard disk	Yes
Oracle	Limited by hard disk	Yes

Data-Logging Load

Data-logging load refers to the total amount of data collected and the frequency of that data being written to the database. This information is determined by the total number of tags in the configurator, along with the respective data collection rate and data logging rate.

TrendWorX32 Logger Configurator uses a logical hierarchical organization. In your configuration, you can create different database groups. Each database group represents a connection to a database. Within each database group are logging groups where you specify to which table in the database your tag information goes. Each logging group represents a set of tables starting with the same base name.

This organization allows for logical data logging in smaller loads within your desired areas of interest. In this way, the database tables are more manageable and the data logging activities uses less system resources. You can also stagger the logging intervals with different logging groups to eliminate simultaneous access to a database.

Although you can have many database groups in a configuration, please keep in mind that there is a limit to the number of simultaneous access to a database server. Depending on the type database you use, the limit is different. For more information on simultaneous connection, you should refer to the database vendor.

The same principal applies to logging groups and tags within a logging group. In general, we recommend that you do not add more than 500 tags per group (depending on available hardware and the overall data-logging load, as well as the database type) and that you configure your data logging activity in such a way that the historical tables created will not exceed a size of 120 MB.

NOTE: Microsoft SQL Server have database-maintenance capabilities even when active connections are open. In certain cases, for an above-average data-logging load it may be preferable to create databases with a large initial size in order to avoid frequent database expansion operations

Avoiding Database Growths

To compute an estimate of required database size, on a per-logging group basis, use the following equation:

Total Number of Records = (Number of Tags x Logging Interval) / (36 x Data-Collection Rate)

Required Size = (Total Number of Records) x (1024 Bytes/Record) x (1.25)

For example, assume you want to data log 100 tags with a data-collection rate of 1 second and a logging interval of 24 hours (converted to seconds). This will require the following:

Total Number of Records = (100) x (24 hours x 60 min/hr x 60 sec/min) / (36 x 1 sec) = 240,000 Records
Required size = (240,000) x 1,024 x 1.25 = 307 MB per day

Note: When you are logging data to an Oracle i9 database, you can expect a 20 percent increase in database size because of the data types supported by Oracle. When logging to Microsoft SQL 2005, 2008 or 2012 databases, you can expect a 20 percent increase in database size.

However, the above example is a worst-case scenario that assumes all tags are updated every second from the OPC server. In reality, OPC servers are event-based, so they will update only when the value of the tag changes. The TrendWorX32 Logger also supports various data-logging filters, as well as Absolute/Percent Deadband. These can be used to reduce the database-storage requirements effectively.

To help you in maintaining the target database size and avoiding situations in which the database size grows uncontrolled, the TrendWorX32 Logger supports a cyclic database table structure. If configured, this feature will always maintain the configured number of tables into the database by overwriting existing data as it rolls over each table. Please refer to the TrendWorX32 Logger Configurator documentation for more information.

When you are using Microsoft Access Database, ICONICS provides a way to compact your database for you. You should do this regularly, especially if you delete tables often in the database. You can compact the database in the TrendWorX32 Logger Configurator in the Tools menu

In addition, keep in mind that ordinary database maintenance tasks, such as defragmentation, compaction, and table index updates, may require additional space on the target device(s), which can vary depending on the database tasks under operation. It is recommended that you allow for additional device space in these cases.

Load of Client Connections

The load of client connections refers to the ability of the database to handle multiple users connected to the database for reading or writing data. Typically, writing to a database is a much more expensive and slower operation than reading data.

TrendWorX32 Logger uses, by default, one constantly open connection to the underlying database while the database group is in runtime mode and data collection is activated. Note that you can modify this behavior in the TrendWorX32 Logger Configurator by disabling the Use Global Connection option. In this case, the database connection will be opened only during the log-to-disk process. We recommend that you only disable the Use Global Connection option when the log-to-disk times are slow (at least every 15 minutes if not less often) or the number of logging groups is small.

You should avoid many database groups for the same Historical Database or Server.

Managing the Database Table Organization

TrendWorX32 Logger provides a database organization and management scheme that allows you to control the database storage and table creation for better performance. The Table Management tab in the TrendWorX32 Logger Configurator shown in Figure 1, allows you to set up an "archive" scheme, which can optimize historical replay and data logging.

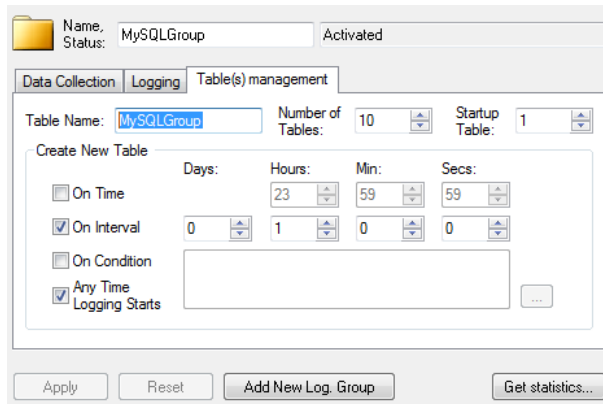


Figure 1 - Table(s) Management

For example, you are logging 250 tags per second and you would like the TrendWorX32 Viewer ActiveX to start up with an initial display of 1 hour's worth of data. You would also like to maintain the data for 7 days.

You can configure TrendWorX32 Logger to create four tables per day by creating a new table every 6 hours and maintaining a total of 28 tables. This approach will:

- Speed up initial historical replay, because only the most recent table will be opened and the size of each table will remain reasonable.
- Speed up data logging, because each table will be a reasonable size.
- Improve system maintenance and backup tasks by avoiding the creation of enormous database tables.

Other Recommendations

MS SQL / MSDE

After installing Microsoft SQL Server, go to the Microsoft SQL Enterprise Manager (this does not apply to MSDE) and:

- Set the "tempdb" size to 120 MB and the transaction log to 20 MB.
- Set the "master" size to 80 MB and the transaction log to 20 MB.



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The initial sizes of "tempdb" and "masterdb" are small. Microsoft SQL Server will increase them on the fly, but it will consume resources. It is always better to start from a decent initial size. To perform this task, select each database, right-click to display the context menu, and select Properties. This opens the Master Properties dialog box, shown in Figure 2, which enables you to adjust the database sizes.

Logical Name	File Type	Filegroup	Initial Size (MB)	File growth	Path
master	Rows ...	PRIMARY	80	By 10 percent, unrestricted growth	C:\Program Files\Microsoft SQL Server\90\MS SQL Server\Master
mastlog	Log	Not Applicable	20	By 10 percent, unrestricted growth	C:\Program Files\Microsoft SQL Server\90\MS SQL Server\Log

Figure 2 - Change Database Size

You should also make sure that:

- The Database Recovery Model is Simple
- The System RAM used is less than 50 % of the total
- The Paging File (Virtual Memory) is set to a large initial size (4 GB)