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hyperI/O LLC

**hIOmon™**

Workload I/O Profiler (WIOP)  
Workload I/O Profiler Files (WIOPF)  
Version 9.6.3560.0 (January 2021)

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\*\*\*\* hIOmon WIOP/WIOPF ReadMe File \*\*\*\*

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NOTICE !

The "Late-breaking news" section contains information that might affect the installation and use of the hIOmon WIOP or hIOmon WIOPF.

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## **1. INTRODUCTION**

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### **1.1 PURPOSE OF THIS README FILE**

This ReadMe file provides a brief product description and operation overview, installation instructions, support information, and software release notes for the hIOmon Workload I/O Profiler (WIOP) and hIOmon Workload I/O Profiler Files (WIOPF) from hyperI/O LLC.

### **1.2 DISTRIBUTION AND USE POLICY**

Please read the hyperI/O LLC Software License Agreement (EUSLA) for the conditions and terms associated with the use (including installation) of the hIOmon WIOP or hIOmon WIOPF from hyperI/O LLC. The EUSLA can be found in the “license.pdf” document file; the “license.pdf” along with the “license.rtf” document files (which are equivalent in content) are copied to the installation directory as part of the hIOmon software installation process. The “license.pdf” can be found within the “Documents” folder.

Do not use the hIOmon software until you have carefully read this EUSLA. Copying, installing, or otherwise using the hIOmon software indicates that you have read, understand and accept this EUSLA and agree to be bound by all of the terms of this EUSLA. If you do not accept this EUSLA, do not copy, install or otherwise use the hIOmon software.

### **1.3 SERVICE DESCRIPTION**

#### **Overview**

The hIOmon WIOP provides an advanced yet simple means of accurately determining the specific “I/O profiles” of your particular devices and applications. Moreover, it allows you to easily and quickly base these I/O profiles upon empirical I/O operation performance metrics,

which are collected within your own actual computer system environment and using your very own applications and devices as you normally do.

The hIOMon WIOP includes the hIOMon “Disk I/O Ranger” software component, which enables you to collect the unique hIOMon “Performance Threshold Range Metrics” upon an individual physical device and process/application basis.

The hIOMon WIOPF extends the WIOP to additionally include options for monitoring your specific files and associated logical devices.

The hIOMon “Disk I/O Ranger Display” can be used to display and export these metrics in real-time. It can also be used to display the I/O operation performance metrics that are contained within “hIOMon Manager Export Files”, which are CSV-formatted (or TSV-formatted) disk files to which the hIOMon WIOP/WIOPF automatically saves the I/O operation performance metrics that it has captured.

The hIOMon “Disk I/O Ranger Display” also includes the hIOMon “I/O Trender Display” software component. The “I/O Trender Display” can be used to display – within a “stacked, time-series graph format” – various hIOMon “Performance Threshold Range Metrics” (IOPS, MBs, QD, and Response Times) that have been retrieved by the hIOMon Disk I/O Ranger.

Determining and understanding disk I/O operation performance is often a daunting task. The hIOMon WIOP and WIOPF enable you to easily, quickly, and accurately collect, display, export, and analyze “*meaningful metrics that matter*”, which go far beyond simple I/O operation counts, amounts of data transferred, and average/maximum response times.

## Features

The many features provided by the hIOMon WIOP and WIOPF include:

- **Individual application/process, disk, and file-level (WIOPF) perspectives.**
- **Specific device selection.**
- **Essential I/O performance statistics - at the individual device and file (WIOPF) level, including the unique hIOMon “Performance Threshold Range Metrics” and “DataTransferred/Time Index (DXTI)” metric along with random/sequential access detection and individual data transfer sizes!**
- **Automatically-summarized performance metrics based upon device and file I/O operation trace data captured by the Microsoft “Event Tracing for Windows (ETW)”. ETW is a robust, Microsoft-developed facility that is implemented and included by default within the Microsoft Windows operating systems supported by hIOMon.**
- **Summarized I/O operation performance metrics provided upon a real-time and historical basis – moreover, optionally upon a specific process basis.**

- **Easy-to-use with a simple windows-type GUI display interfaces, including histogram and “stacked, time-series graph” formats along with a “Synopsis” display option that provides a brief, general summary of key performance values with the associated time context.**
- **Comma-Separated-Values (CSV) and Tab-Separated-Values (TSV) export capabilities (including selectable export field options and coalescing capabilities).**
- **Version specific support for connecting to remote computer that is running the hIOMon Manager service; both Microsoft WMI and hIOMon REST API connection options are supported.**
- **Configurable display and setup options.**
- **“Code-signed” (i.e., digitally-signed) installation and software component files to ensure the integrity of the hIOMon software as provided by hyperI/O LLC.**
- **Maintains privacy and security: no I/O operation trace data, metrics, file names, system information, or any other Personally Identifiable Information is transferred (e.g., uploaded) to hyperI/O LLC.**
- **Easy and quick to install – installs in minutes using the standard Windows Installer along with automated configuration script (simply select the devices to be monitored).**
- **No application, operating system, file, file system, or device changes required.**
- **Extensive help information.**

## Uses

You can easily use the powerful features of hIOMon to quickly and effectively handle such tasks as:

- **Identify devices with poor I/O performance.**

As the first step in analyzing performance problems with key applications, you can quickly use the hIOMon WIOP/WIOPF to determine if the associated devices are experiencing poor I/O operation performance (and to exactly what extent if so); you can even get summarized file I/O operation performance metrics upon a specific process basis (WIOPF).

- **Impact of system changes upon device and file I/O performance.**

The hIOMon WIOP/WIOPF allow you to determine the actual impact (with precise measurements as evidence) of changes within the computer system (such as the addition, replacement, or modification of: disk subsystems, computer memory, file systems,

processors, operating systems, etc.).

- **Product/system comparisons, particularly amongst vendors.**

Without having to rely only upon benchmarks (and needing to correlate how closely these benchmarks match your particular applications), hIOmon allows you to use your actual applications and associated files just as you normally would with the products and/or systems that you want to compare (such as different disk subsystems, servers, etc., perhaps from different vendors) to see their effect on (even specific) device and file I/O operation performance.

- **Monitor and confirm Quality of Service (QoS) for device and file I/O performance.**

The hIOmon WIOp allows you to (independently) monitor the actual I/O operation activity of your (specific) devices. The hIOmon WIOpF extends this to including specific file I/O operation monitoring. You can easily confirm whether these devices and associated files are meeting your expectations regarding I/O performance.

With all of its features and benefits, the hIOmon software is “The I/O Speedometer and Odometer for your Files, Devices, and Applications”™ with the hIOmon WIOp/WIOpF an essential tool required to help you qualify, validate, maintain and monitor the I/O operation performance of your devices and files.

Please send questions or comments about hIOmon to [hIOmonSupportInfo@hyperIO.com](mailto:hIOmonSupportInfo@hyperIO.com).

## **Architecture**

The hIOmon WIOp/WIOpF feature a very flexible and scalable software architecture. It is comprised of the following three (3) main components:

### **Disk I/O Ranger Display Application**

The hIOmon "Disk I/O Ranger Display" is a Microsoft Windows HTML Application (HTA) that provides a standard windows-type graphical user interface (GUI). This GUI communicates with the hIOmon Manager to set the various control options of the hIOmon I/O Monitor (such as which particular devices are to be monitored and the particular types of I/O operation performance metrics to be collected). The "Disk I/O Ranger Display" is also used to display the collected device and file I/O operation performance statistics in real-time (and also historically from hIOmon Manager Export Files).

### **Manager**

The hIOmon "Manager" runs as an operating-system service (daemon). It manages the hIOmon "I/O Monitor" component (largely based upon control option requests from or set by the hIOmon "Disk I/O Ranger Display" application); it also transforms, records,

and transfers the collected device and file I/O operation performance metrics to the "Disk I/O Ranger Display". The hIOMon "Manager" allows the hIOMon "I/O Monitor" component to be much simpler, faster and efficient in operation.

### **ETW I/O Monitor**

The hIOMon "ETW I/O Monitor" is a lightweight component integrated within the hIOMon Manager. It controls the configuration and operation of the ETW facility for disk and file I/O operation monitoring. It also performs the actual, real-time summation of the I/O operation trace data collected by the ETW, thus producing the various hIOMon summary I/O operation performance metrics.

The hIOMon "ETW I/O Monitor" does not require any file system modifications nor does it require any operating system code changes (nor application or file changes).

The hIOMon Disk I/O Ranger software also includes a hIOMon "WMI Support DLL" component (that provides Windows Management Instrumentation support for the hIOMon "Disk I/O Ranger Display") along with a hIOMon "Client Communication DLL" (that acts as an interface between the hIOMon Manager and the hIOMon WMI support components).

## **1.4 OPERATING SYSTEMS AND ASSOCIATED SOFTWARE**

### **System requirements**

Note: See the "Late-breaking news" section for more information on using and configuring the hIOMon WIOP and hIOMon WIOPF software in the Windows 10, Windows Server 2016, and Windows Server 2019 operating system environments.

The hIOMon WIOP/WIOPF software has the following minimum system requirements:

- IBM PC (or 100% compatible)
- 15 MB (megabytes) or more of free hard disk space for the hIOMon software components at installation
- Microsoft Windows 10 (Final Release or above) or Windows Server 2016/2019 (Final Release or above) – 64-bit versions
- Microsoft Internet Explorer version 10 (Final Release or above)
- The Windows Management Instrumentation (WMI) Core 1.5 software package is required for the hIOMon "WMI Support". This WMI core software package is already installed by default on Windows 10/2016/2019.
- Microsoft Visual C++ Runtime Libraries. Note that these libraries are automatically be installed as part of the hIOMon software installation process.

- Pentium® 233 MHz or faster processor
- 512MB or more RAM (Windows 10/2016/2019).

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## 2. LATE-BREAKING NEWS

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This section contains information that might impact the installation and use of the hIOmon products and services. It also includes a brief description of new features incorporated in the latest version of hIOmon.

**NOTE:** All released hIOmon version components are General Availability (GA) versions of hIOmon. If you encounter any errors or difficulties, please let us know by contacting hyperI/O LLC Technical Support (see section 6 for contact information).

### 2.1 NEW FEATURES

Version 9.6.3560.0 is a maintenance release of the hIOmon software that supports version 9.6.3560.0 of the hIOmon REST API software. The prior version 9.6.3148.0 introduced support for the new “Synopsis” display option provided by the hIOmon “I/O Trender Display”, which is included with the hIOmon Disk I/O Ranger Display.

This display option provides a brief, general summary of key performance values along with the associated time context. The time context includes the respective “Time Scope”, which is the overall time period associated with the performance values; the Time Scope can be a day, week, month, one or more quarters, or a year.

In addition to the Time Scope and related metrics (i.e., “Observation Period” and “Active Time” percentages), the following I/O operation performance values are displayed for the associated Time Scope: I/O Count, Data Transfer amount, and hIOmon “DataTransferred/Time Index (DXTI)” for the monitored item. Several hIOmon “Performance Threshold Range Count” related metrics can also be optionally included within the Synopsis display.

Recent prior versions introduced new “sort-order” options provided by the hIOmon Disk I/O Ranger Display to hIOmon Manager Export Files. In addition, support was added for creating hIOmon Manager Export Files that are generated using the “Tab-Separated-Values (TSV)” file format along with support for user-specified threshold values associated with the hIOmon “Performance Threshold Range Metrics”.

Other recent prior versions introduced support for Windows Server 2019 and for the “hIOmon User-Interface (UI) AddOn”, which provides additional user-interface software components that can be used together with the hIOmon WIOP and hIOmon WIOPF. These additional user-interfaces includes the hIOmon CLI, the hIOmon Browser, and the hIOmon PerfLib support for the Microsoft Performance Monitor.

Also previously introduced was “I/O Operation Trace” support within the hIOMon WIOPF. This support provides the option to export individual I/O operation trace records to a hIOMon Manager Export File. In addition, these I/O operation trace records can now optionally include several new fields, namely, the “Process ID (PID)”, the “Thread ID”, and the “I/O Priority Hint” associated with each individual I/O operation.

Prior versions of this hIOMon software introduced support for the Microsoft “Event Tracing for Windows (ETW)” facility. The hIOMon “ETW I/O Monitor” utilizes disk and file I/O operation trace data that has been captured by the ETW rather than that captured by the hIOMon kernel-mode I/O device driver, which is not included within the hIOMon WIOP or the hIOMon WIOPF software installation packages.

The hIOMon “ETW I/O Monitor” effectively replaces the “hIOMon I/O Monitor” software component previously used by hIOMon, thus removing system reboot requirements and concerns about the use of third-party operating system kernel components.

Both the hIOMon WIOP and the hIOMon WIOPF continue to include the hIOMon “Disk I/O Ranger Display” component along with its associated hIOMon “I/O Trender Display”.

The hIOMon “I/O Trender Display” can be used to display – within a “stacked, time-series graph format – various hIOMon “Performance Threshold Range Metrics” (IOPS, MBs, and Response Times) that have been retrieved by the hIOMon Disk I/O Ranger. These metrics are shown by the I/O Trender Display in accordance with the various configuration options provided by the I/O Trender Display. The I/O Trender Display graphs are displayed within the bottom frame of the hIOMon Disk I/O Ranger “Main Display” window.

The hIOMon “I/O Trender Display” enables you to quickly and easily visualize the Performance Threshold Range Metrics over varying periods of time in a simple, concise graph format that is dynamically user-configurable.

The hIOMon “Performance Threshold Range Metrics” are a selected set of summarized I/O operation performance metrics that are specifically focused upon the ranges of I/O operations per second (IOPS), megabytes-per-second (MB/s) data transfer rates, response times (RT), and I/O operation queue depths/lengths (QD), and data transfer sizes/lengths (DTS) actually observed by the hIOMon ETW I/O Monitor for individual devices, files, and processes. These metrics are automatically included within the summarized I/O operation performance information that can be collected by the hIOMon ETW I/O Monitor component of the WIOP/WIOPF.

Please note that the hIOMon “Performance Threshold Range Metrics” reflect the actual I/O operation activity observed by the hIOMon ETW I/O Monitor. For instance, the “IOPS 1 - 99” Range Count for read I/O operations reflects the number of one-second intervals during which the hIOMon ETW I/O Monitor actually observed a total number of monitored read I/O operations that was one or more, but less than 100 read I/O operations.

The hIOMon “Performance Threshold Range Metrics” provide a quick and easy way to assess the **actual** “speeds and feeds” I/O performance of your particular devices, files, and applications in everyday, normal usage! And the hIOMon “Disk I/O Ranger Display” provides a quick and easy way to display and export these metrics!



The hIOmon WIOP and hIOmon WIOPF also include the hIOmon “DataTransferred/Time Index (DXTI)” metric, which provides a “high-level” means for a relative comparison of I/O operation performance, where “higher is better” (i.e., the higher the Index number, the better the performance). This Index metric is provided upon an individual device, file, and process/application basis; it resembles the “fuel economy” index for an automotive vehicle (i.e., “miles-per-gallon” or “kilometres/litre”) as an overall measure of “performance efficiency”.

The hIOmon “DataTransferred/Time Index” metric can be displayed and exported by the hIOmon Disk I/O Ranger Display application.

Please refer to the hIOmon Disk I/O Ranger help information for additional details about the hIOmon Disk I/O Ranger software component. This help information is included within the hIOmon Disk I/O Ranger application and is also available for viewing at the hIOmon web site.

Also please be sure to read the “Hints and Issues” section below for additional suggestions about using the hIOmon software.

## **2.2 KNOWN PROBLEMS**

None to report currently. Please report any problems to hyperI/O LLC (see section 6 for contact information).

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## **3. INSTALLATION**

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This section contains instructions for installing the hIOmon WIOP and hIOmon WIOPF software under Windows 10, Windows Server 2016, and Windows Server 2019.

NOTE: The hIOmon WIOP and hIOmon WIOPF software components support Windows 10, Windows Server 2016, and Windows Server 2019.

See the "Hints and issues" section to solve issues that might occur when installing the software.

### **3.1 INSTALLATION NOTES: ALL MICROSOFT WINDOWS PLATFORMS**

The hIOmon Installer software makes use of the Microsoft Windows Installer to perform the basic installation of the hIOmon software.

### **3.2 INSTALLATION INSTRUCTIONS: WINDOWS 10/2016/2019**

To install the hIOmon software on Windows 10/2016/2019:

1. Quit all open programs.
2. When installing the downloaded version of the hIOmon software, either “Run” the

hIOmon software installation package file directly or save the package file to a folder upon your computer.

The hIOmon software installation package file for 64-bit systems only is named “hIOmonInstall64.exe”.

Simply run the “hIOmonInstall64.exe” file, which will invoke the Microsoft Windows Installer utility to perform the actual installation of the hIOmon software. When the welcome screen opens, follow the instructions on the screen.

**NOTE:** To install the software on Windows 10/2016/2019, you must log on with administrator privileges. Also note that the hIOmon software installation files are “code-signed” (i.e., digitally-signed), which ensures that these files came from hyperI/O LLC and protects them from alteration after publication by hyperI/O LLC.

3. Follow the instructions on the screen. Please note that you must agree to the hyperI/O “End-User Software License Agreement (EUSLA)” for the installation process to proceed.

If you are prompted for a **serial number**, please be sure to correctly enter the serial number that you obtained from hyperI/O LLC.

The hIOmon Manager and hIOmon ETW I/O Monitor software components must be loaded as a service under Windows 10/2016/2019. The Windows Installer installation process provides a “Custom Installation Option” to enable the Windows Installer installation process to automatically load (as part of the installation process) these hIOmon software components. This “automatic load” installation option is a **recommended** option (and so is enabled by default).

However, if you decide not to enable this “automatic load” installation option, then you must manually load the hIOmon Manager and hIOmon ETW I/O Monitor software components before you can use the hIOmon software. To manually load these hIOmon software components, click on the “Manually Load the hIOmon Manager and IO Monitor” shortcut found within the “hIOmonSI” directory where the hIOmon software was installed as part of the Windows Installer installation process. Also note that on operating systems such as Windows 7 and 8, “administrator privilege” level must first be enabled prior to clicking on this shortcut. This can be done by going to the shortcut using Windows Explorer, selecting the shortcut and then right-click, select the “Properties” menu option, click on the “Compatibility” tab, and then check the “Run this program as an administrator” checkbox under the “Privilege Level” section. Then double-click on the shortcut to run the shortcut.

In addition to loading the hIOmon Manager and its integrated hIOmon ETW I/O Monitor software component as a service under Windows 10/2016/2019, the “load” process (whether invoked automatically as part of the Windows Installer installation process or manually thereafter) also uses the hIOmon “Service Installation” program to perform the

following:

- Invoke the Windows Service Control Manager to immediately start the hIOmon Manager.
- Compile/load the hIOmon WMI MOF file (into the WMI Repository) and register the hIOmonWMI DLL component, both of which are required for the hIOmon WMI Support that is used by the hIOmon “Disk I/O Ranger Display” application.

**NOTE** that the hIOmon Manager is loaded such that it will automatically be started when Windows 10/2016/2019 starts. The hIOmon Manager is configured by default (by the software installation process) so that the hIOmon Manager will automatically start its associated hIOmon ETW I/O Monitor in real-time mode when the hIOmon Manager is started.

### **Install the hIOmon Disk I/O Ranger Display Only**

The Windows Installer installation process provides a “Custom Installation Option” to enable the Windows Installer installation process to only install the hIOmon Disk I/O Ranger Display software components. This option can be selected by enabling the “Install hIOmon Disk I/O Ranger only” checkbox. Note that the other Custom Installation options will be ignored if this checkbox is enabled.

Also note that the “Install hIOmon Disk I/O Ranger only” option is only available with the Workstation/Server versions of the hIOmon WIOP and hIOmon WIOPF software packages. When installed using this option, the hIOmon Disk I/O Ranger Display can be used to connect to a remote computer that is running the hIOmon Manager service. Both WMI and hIOmon REST API connection options are supported.

4. An automated configuration script is run as part of the software installation process. Select whether you simply want to monitor and collect I/O operation metrics for the operating-system physical disk associated with the system Logical Disk (typically the C: logical drive); this is the default option. You can instead select to explicitly specify one or more Logical Disks to indicate other additional physical disks to be monitored. Note that you can later use the hIOmon Disk I/O Ranger Display configuration Settings “**Reconfigure**” option to modify which particular devices are to be monitored by the hIOmon software.
5. The setup takes a few minutes.

Please check the System Event Log “Application Log” to see the results of the hIOmon software installation process.

6. **Activation** of the subscription-fee time period. The hIOmon software is immediately ready to use after the software installation process has completed. A “temporary licensing period” is established when the hIOmon software is installed. This period is

seven (7) days in length; it begins upon the date that the hIOMon software is installed. The expiration date of this period is the day following the last day of the temporary licensing period. The hIOMon software **will no longer be operable** when this expiration date is reached.

This temporary expiration date can be removed, and the full subscription-fee time period instated by the activation of a "hIOMon Extension Key". The requisite "hIOMon Extension Key" must be obtained from hyperI/O LLC and then activated during the temporary licensing period (i.e., before the temporary expiration date is reached).

A "hIOMon Key" is a specific software character-string value generated by hyperI/O LLC based upon the particular hIOMon Product ID and installation date of the installed hIOMon software package. When activated, the proper hIOMon Key will remove the temporary licensing period and advance the expiration date in accordance with the actual hIOMon software installation date and the time period purchased by the subscription fee (e.g., 30 days from the date when the hIOMon software was installed). Please note that attempts to activate invalid hIOMon Keys can cause **fatal** hIOMon software errors.

Both the hIOMon Product ID and the actual hIOMon software installation date must be provided to hyperI/O LLC when obtaining a hIOMon Key; these are required so that the proper key value can be generated. Click on the "About" button to display the hIOMon Product ID, software installation date, and current expiration date.

Note that the hIOMon Manager will verify the installation date used to generate a hIOMon Key when you attempt to activate the key (i.e., the actual installation date is not verified when the hIOMon Key is generated).

To activate a hIOMon Key, first click on the "Activate Key" button at the bottom of the hIOMon Disk I/O Ranger Display "Settings" window. This will result in the "Enter hIOMon Extension Key" input text field being shown within the Settings window display. Enter the "hIOMon Extension Key" value into the input text field, then click on the "Activate" button to activate the key. A message will be displayed at the bottom of the "Settings" window display to report whether the activation was successful or not.

### **3.3 Uninstalling the hIOMon software**

Use the Windows "Control Panel" to remove the installed hIOMon software. Select "Add/Remove Programs" within the "Control Panel", then select "hIOMon" within the list box and click on "Remove" to remove/uninstall the hIOMon software.

As part of the uninstall process, the Windows Installer will automatically invoke the hIOMon "Service Installation" (hIOMonServiceInstall.exe) program, which in turn uses the Windows Service Control Manager to unload the hIOMon Manager component as a service under Windows 10/2016/2019; the hIOMon "Service Installation" utility will also automatically unload/remove the hIOMon WMI MOF file from the WMI Repository and un-register/unload the hIOMonWMI DLL component (both of which are required to provide the hIOMon WMI Support).

**NOTE:** The hIOMon Manager is first stopped prior to requesting that it be unloaded by the Windows Service Control Manager.

Please check the System Event Log “Application Log” to see the results of this hIOMon Service Installation program invocation.

**NOTE:** When the hIOMon software is uninstalled as described above, several subdirectories (and their contents) will remain within the directory into which the hIOMon software was installed (in addition to the “hyperIO” folder within the “ProgramData” folder and any hIOMon folder that might be located within the VirtualStore folder on Windows 7 and later operating systems). See the “readMe.txt” files in the following subdirectories for additional details: hIOMonGr and AddOns. The “hIODiorDisplay.parms” file might also remain within the VirtualStore folder; this file is generated and used by the hIOMon Disk I/O Ranger Display application to maintain configuration information related to the use of the hIOMon Disk I/O Ranger Display. **NOTE** that you must **manually** delete this file (along with the files/folders mentioned above) to totally remove the hIOMon software package.

In addition, for the latest Windows versions, various hIOMon registry entries and hIOMon files can remain present despite the successful uninstall of the hIOMon software package by the Windows Installer. A hIOMon PowerShell script can be used to remove these hIOMon registry entries and files. This PowerShell script is named “Run-hIOMonCleanupAfterUninstall.ps1” and is located within the “hIOMonWMI\Scripting\PowerShell” folder where the hIOMon software was installed. This script requires administrator privileges and should only be run after the Windows Installer has completed the uninstallation of the hIOMon software. Note that this script will unload the hIOMon WMI Provider if it is currently loaded and will remove the remaining hIOMon registry entries along with the hIOMon files that are still present within the system folder.

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## **4. OPERATION**

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### **4.1 GETTING STARTED**

To use/run the hIOMon "Disk I/O Ranger Display", simply double-click upon the "hIOMon Disk I/O Ranger" desktop icon or use the “Start -> Programs -> hIOMon -> hIOMon Disk I/O Ranger” shortcut.

You can also run the display by simply double-clicking upon the "hIOMonDiskIORanger.hta" file located within the “hIOMonDiskIORanger” folder.

As noted (item 4) within the “Installation Instructions” section above, an automated configuration script is run during the installation of the WIOP and WIOPF software. This script configures the hIOMon ETW I/O Monitor software to monitor the operating-system physical disk associated with the system Logical Disk (typically the C: logical drive). A customized installation option is provided during the WIOP and WIOPF software installation process that

allows you to explicitly specify one or more Logical Disks to indicate other additional physical disks to be monitored.

In addition, the script automatically configures the hIOMon software so that three distinct types of hIOMon Manager Export Files are created and activated. These export files are configured to contain a comprehensive set of summarized I/O operation performance metrics for the individual devices and processes that are monitored. These summary metrics go far beyond simple I/O operation counts and data transferred amounts and include the hIOMon "Performance Threshold Range Metrics", random and sequential access metrics, and much more. In addition, these hIOMon Manager Export Files can subsequently be used as the input source of metrics for display by the hIOMon "Disk I/O Ranger Display".

One type of hIOMon Manager Export File will contain the summary I/O metrics for the physical disks being monitored (WIOP) or for the Logical Disks and physical disks being monitored (WIOPF). A separate type of export file will contain a variety of "Data Transfer Size (DTS)" summary metrics for the physical disks being monitored; these DTS metrics reflect I/O operation activity observed by the hIOMon ETW I/O Monitor for I/O operations whose data transfer size/length was that of the corresponding size/length. The third export file type will contain summary I/O metrics for each individual process instance that directs I/O operations towards the disks being monitored.

Please note that these summary I/O operation performance metrics are collected upon a cumulative basis and are offloaded/written to the export files upon a ten-minute periodic basis. These hIOMon Manager Export Files are configured so that the maximum allowed size for an individual export file is four mebibytes (i.e., roughly 4 megabytes). A separate new hIOMon Manager Export File of the same type will automatically be created when this maximum size is reached for an export file.

Also note that the hIOMon Disk I/O Ranger "Settings" window display "**Reconfigure**" button can be used to modify the hIOMon "Filter Selection" (so as to alter which particular devices are to be monitored) and that the use of this button does **not** modify any of the existing hIOMon Manager Export Files.

For additional details, please refer to the steps described within the "Getting Started" section of the hIOMon Disk I/O Ranger Display help information.

## **4.2 DISK I/O RANGER CONTROL AND DISPLAY DESCRIPTIONS**

As an HTML-application, the hIOMon "Disk I/O Ranger Display" software provides an easy-to-use method of controlling the overall operation of hIOMon and displaying, in a clear and organized fashion, the collected device and file I/O operation performance information. The WIOP and WIOPF support both a "real-time" display mode along with the display of summary I/O operation performance metrics contained with hIOMon Manager Export Files.

Please refer to the hIOMon Disk I/O Ranger help information for a complete description of the various Disk I/O Ranger Display control commands and display features.

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## **5. HINTS AND ISSUES**

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### **5.1 HINTS**

The hIOMon WIOP and the hIOMon WIOPF allow you to take a “**top-down**” approach to analyzing, evaluating, and understanding the actual I/O operation performance of your particular devices, files, and processes/applications/workloads of interest. This approach enables you to empirically view the device and file I/O operation performance of your particular system from an overall perspective, and moreover using your own specific system as you normally do.

### **5.2 SOFTWARE ISSUES**

None to report. Please see the hIOMon web site for any recent announcements.

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## **6. TECHNICAL ASSISTANCE AND SUPPORT INFORMATION**

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### **6.1 OBTAINING ADDITIONAL INFORMATION FROM hyperI/O LLC**

The hIOMon website provides additional information about hIOMon (including technical assistance and support information). You can also contact hIOMon Technical Support at hIOMonSupportInfo@hyperIO.com.

### **6.2 OBTAINING INFORMATION VIA THE INTERNET**

The hyperI/O LLC website is located at [www.hyperIO.com](http://www.hyperIO.com). You can also reach hyperI/O LLC via the hIOMon website (located at [www.hIOMon.com](http://www.hIOMon.com)).

### **6.3 ORDERING SOFTWARE**

To order additional licenses of the software, visit the hIOMon website or contact hyperI/O LLC:

Request by Phone: +1 303.415.2044

Request by Mail: hyperI/O LLC  
4450 Arapahoe Avenue, Suite 100  
Boulder, Colorado 80303-9102 USA

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## 7. LEGAL STATEMENTS

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### 7.1 TRADEMARK NOTICES

hyperI/O<sup>sm</sup>, hIOmon<sup>TM</sup>, “How fast are your files?”<sup>TM</sup>, “Bringing Transparency to Disk I/O Performance”<sup>SM</sup>, and “The I/O Speedometer and Odometer for your Files, Devices, and Applications”<sup>TM</sup> are trademarks of hyperI/O LLC.

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### 7.2 LEGAL NOTICE

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\*\*\*\* End of hIOmon WIOP/WIOPF ReadMe \*\*\*\*  
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