Counter Manager Performance Grapher User Guide

Version 2.6

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Preface

This document provides information about installing, administering and generating graphs using Counter Manager Performance Grapher (CMPG) and CmDownload tool.

AUDIENCE

The primary audience for this document is NetApp personnel and partners who are using CMPG in the context of performance trending analytics.

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INFORMATION ABOUT THIS DOCUMENT

All information about this document including version history, review and approval, typographical conventions, references, and a glossary of terms can be found in the final chapter of this document.

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1 Introduction

The Counter Manager Performance Grapher (CMPG) is a Microsoft® Windows® executable that can be used to produce performance graphs from Counter Manager data.

Counter Manager data (CM data) is sent to NetApp® on a weekly basis through the performance AutoSupport™ feature of Data ONTAP®. You can also use the CMPG to process data from performance archive files.

The output file is a Microsoft Excel workbook. The graphs and data sheets within the workbook can be used for high level performance analysis, and is mainly leveraged by Professional Services personnel. This document describes CMPG, version 4.4.6.

The following are features of CMPG:

- Support of 8.2 C-mode asup hourly stats files and archive files
- Availability of trend performance data for as long as needed (the only limitation is the number of weeks of data files available for analysis and the resources available to you). A typical trending use case is 26 weeks, up to 1 year or more in rare cases
- Data input source for NetApp sizing tools to provide the most accurate sizing recommendations possible. (For example, what is the 75% percentile NFS workload of this system over the last 6 months?)
- Ability to output all CM data elements in a chart and tabular form.
- Ability to specify format (chart, tabular, or both) of data elements using XML configuration files.
- Ability to share configuration files between end users
- Ability to provide statistical analysis of performance data (For example, standard deviations, predictive trending, min, max, and average over time, workload forecasting)

Counter Manager Data

CM data is available on storage controllers running Data ONTAP 7.0.3 through Data ONTAP 8.x. CM data can be downloaded in the following ways:

- From the NGS AutoSupport Search Tool (http://asup-search.corp.netapp.com/cgi-bin/liteHome/netappLite.cgi)

  Search using either the Hostname or the SysID (system ID). Note: if you search using Sys Srl Num, you will not get the results.
- Pulling CM data directly from a running NetApp controller

  The `/etc/log/.cm_hourly_stats_done` file is compressed and does not need uncompressing for use with CMPG.
  Note: Remove the period from the start of this file before processing with CMPG.
- CmDownload tool which can download CM data and other supporting files from ASUPDW (internal NetApp access only). CmDownload is included in the CMPG installation package.
- For Clustered Data ONTAP Systems, CMDownload download Hourly-stats-info.xml and Hourly-stats-data.xml
- Manually download the Performance Archiver files from a NetApp controller. These files must be downloaded directly from a NetApp controller and are at these location:

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- Data ONTAP 7.3: `/etc/stats/archive`
- Data ONTAP 7.3.2+: a symlink made from `//log/stats/archive to /etc/stats/`archive
- Data ONTAP 8.0+: directory moved from `/etc/stats/archive to /etc/log/stats/`archive
- Data ONTAP 8.2+: directory is moved to `/mroot/etc/log/stats/cores`

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2 Installation and configuration

This section describes the installation details and supported configurations for CMPG.

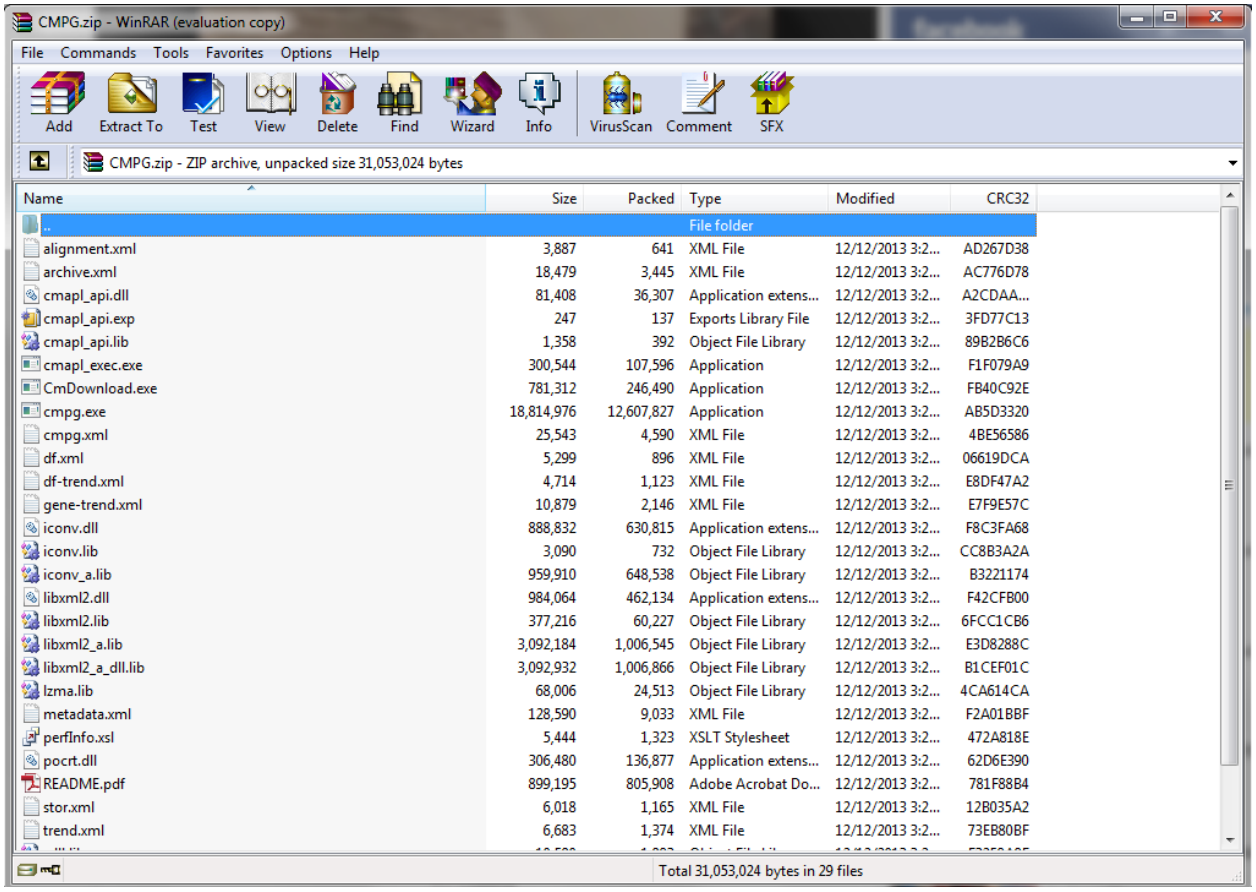
2.1 Installation

Follow these steps to install CMPG.

1. Download the most recent version of CMPG from this location:

   http://fieldportal.netapp.com/cmpg.aspx

2. Unzip the installation package to a location on your local machine.



Name	Size	Packed	Type	Modified	CRC32
..			File folder		
alignment.xml	3,887	641	XML File	12/12/2013 3:2...	AD267D38
archive.xml	18,479	3,445	XML File	12/12/2013 3:2...	AC776D78
cmapl_api.dll	81,408	36,307	Application extens...	12/12/2013 3:2...	A2CDAA...
cmapl_api.exp	247	137	Exports Library File	12/12/2013 3:2...	3FD77C13
cmapl_api.lib	1,358	392	Object File Library	12/12/2013 3:2...	89B2B6C6
cmapl_exec.exe	300,544	107,596	Application	12/12/2013 3:2...	F1F079A9
CmDownload.exe	781,312	246,490	Application	12/12/2013 3:2...	FB40C92E
cmpg.exe	18,814,976	12,607,827	Application	12/12/2013 3:2...	AB5D3320
cmpg.xml	25,543	4,590	XML File	12/12/2013 3:2...	4BE56586
df.xml	5,299	896	XML File	12/12/2013 3:2...	06619DCA
df-trend.xml	4,714	1,123	XML File	12/12/2013 3:2...	E8DF47A2
gene-trend.xml	10,879	2,146	XML File	12/12/2013 3:2...	E7F9E57C
iconv.dll	888,832	630,815	Application extens...	12/12/2013 3:2...	F8C3FA68
iconv.lib	3,090	732	Object File Library	12/12/2013 3:2...	CC8B3A2A
iconv_a.lib	959,910	648,538	Object File Library	12/12/2013 3:2...	B3221174
libxml2.dll	984,064	462,134	Application extens...	12/12/2013 3:2...	F42CFB00
libxml2.lib	377,216	60,227	Object File Library	12/12/2013 3:2...	6FCC1CB6
libxml2_a.lib	3,092,184	1,006,545	Object File Library	12/12/2013 3:2...	E3D8288C
libxml2_a_dll.lib	3,092,932	1,006,866	Object File Library	12/12/2013 3:2...	B1CEF01C
lzma.lib	68,006	24,513	Object File Library	12/12/2013 3:2...	4CA614CA
metadata.xml	128,590	9,033	XML File	12/12/2013 3:2...	F2A01BBF
perfInfo.xsl	5,444	1,323	XSLT Stylesheet	12/12/2013 3:2...	472A818E
pocrt.dll	306,480	136,877	Application extens...	12/12/2013 3:2...	62D6E390
README.pdf	899,195	805,908	Adobe Acrobat Do...	12/12/2013 3:2...	781F88B4
stor.xml	6,018	1,165	XML File	12/12/2013 3:2...	12B035A2
trend.xml	6,683	1,374	XML File	12/12/2013 3:2...	73EB80BF

3. Add CMPG and CMDOWNLOAD paths to the computer's path environment.
4. Apply your changes.

   You are now ready to run CMPG and CMDOWNLOAD from the CLI.

2.2 Supported configurations and platforms

.Net Framework 4.0 is required to be installed in the machine irrespective of the Windows platform.

Note: CMPG is not tested or supported on any other configurations of Microsoft operating system or Microsoft Excel.

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The following is a list of supported platforms:

- Windows 7 (64-bit) with Microsoft Office 2010.
- Windows 7 SP1 (32-bit) with Microsoft Office 2010.
- Windows 7 SP1 (64-bit) with Microsoft Office 2007
- Windows 8 (64-bit) with Microsoft Office 2010

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3 New features of CmDownload and CMPG

This section describes new capabilities added to CmDownload 3.3 and CMPG 4.4.6.

3.1 New CmDownload features

The following are new features of CmDownload:

- CMDownload v3.3 has been updated to download files from DW4, the new Netapp ASUP infrastructure, instead of ASUP DW3.

3.2 New CMPG features

The following are new features of CMPG v4.4.6:

- Defect fixes

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4 Limitations of CMPG and CmDownload

This section describes the current known limitations of CMPG and CmDownload.

The counters added to cmpg.xml are based on feedback from CMPG users and NetApp engineering. These counters are not exclusive to the Clustered ONTAP systems, and the outputs can be expected for unclustered (7-mode) systems

Within the default cmpg xmls, there are the following 7-mode counters that do not have equivalent counters for Clustered ONTAP systems:

fcp:fcp_latency
fcp_lif:avg_other_latency
fcp:fcp_ops
iscsi:iscsi_ops
iscsi:iscsi_write_data
iscsi:iscsi_read_data
target:write_data
target:read_data
system:max_cpu
hostadapter:max_link_data_rate

If you have the counters, you can add it to the xmls and generate the charts.

Please provide feedback on these counters so that they can be added to cmpg.xml, allowing all of the charts for unclustered systems to be available for Clustered ONTAP systems.

CmDownload does not support the following scenarios:

- If the number of files CMPG processes is greater than 1500 in a single command.
- XML content retrieved from the AutoSupport data repository is equal to or greater than 10MB. This is because the XML response contains embedded metadata and the CM data file links used to download CM data files.

As a workaround for these limitations, download these files manually into CMPG.

This data can be retrieved from http://reaper.eng.netapp.com/cgi-bin/liteHome/netappLite.cgi by going into ASUPs and right-clicking to save specific sections."

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5 Using CMPG

This chapter describes how you can use CMPG, after you have installed it.

5.1 CmDownload usage

CmDownload tool is a Microsoft Windows executable file that is executed from the CLI.

Command syntax:

`CmDownload [-filer <system_ID_or_hostname>] [-serial <system_serial_number>] [-weeks <number_of_weeks>] [-command <command_name>]  [-zip]`

Table 1 describes the available options:

Table 1 - CmDownload options

Option	Arguments	Description	Required/ optional
`-filer`	< system_ID_or_hostname >	Specifies the system ID or hostname you wish to search for. It is highly recommended to use system ID as hostnames can be ambiguous. System IDs shorter than 10 digits will be padded with zeros.	Required if –serial is not specified
`-serial`	<sys_serial_number>	Specifies that you wish to search by system serial number.	Required if –filer is not specified
`-weeks`	<number of weeks>	The number of weeks to download. Defaults to 1.	Optional
`-command`	<command name such as DF, DF-A, DF-R, DF-S, VOL-STATUS>	Search for the output of a specific command. Specify this option several times if you want the output from several commands. Using this option prevents the download of the CM-HOURLY-STATS.gz. Remember these are file names as stored in ASUPDW, not command line syntax.	Optional
`-zip`	N/A	Adds all the downloaded files into a zip file. Not recommended when searching for CM-HOURLY-STATS.gz files.	Optional
`-dirserial`	N/A	The option forces CmDownload to make directory for placing downloaded files with name as serial number.	Optional
`-version`	N/A	Print version information	Optional
`-help`	N/A	Print the option information	Optional

Note: All options can be shortened as long as they not ambiguous. For example, `-filer` can be shortened to `-f`.

CmDownload is used to download CM data files or command metadata files from AutoSupport. CmDownload places the downloaded files into directory/directories accordingly as per the following:

- If `-filer` <hostname> option is specified and hostname is unique then the directory name is <hostname>.

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- If `-filer` <hostname> option is specified and hostname is not unique, which means it can be mapped to different serial numbers, then directory name is named as `<hostname-sys_serial_number>`.
- If `-dirserial` option is specified then directory name is named as `<sys_serial_number>`.

Examples:

- Download CM-STATS.gz and configuration metadata for the last 4 weeks to subfolder that matches the NetApp controller name. In case of >8.1 Clustered Data ONTAP Systems, Hourly-Stats-Data.xml and Hourly-Stats-Info.xml files get downloaded.

  `cmdownload -f <hostname or sysid> -w 4`
- Download CM-STATS.gz and configuration metadata for the last 4 weeks to subfolder that matches the NetApp serial numbers. In case of >8.1 Clustered Data ONTAP Systems, Hourly-Stats-Data.xml and Hourly-Stats-Info.xml files get downloaded.

  `cmdownload -s <serialnumber> -w 4`
- Download the last 24 weeks space utilization data using a NetApp controller hostname or system ID and place the contents in a zip file

  `cmdownload -f < hostname or sysid> -w 24 -c DF -c DF-A -c DF-S  -c DF-R zip`

5.2 CMPG usage

CMPG tool is executed from the command line.

Command syntax:

`cmpg [-filename input_file] [-details] [-storage filename] [-raid filename] [-logo logo_file] [-xml config_file] [-metadata metadata_file] [-perfInfo] [-noPrompt] [-noDataAverage] [-analysis] [-gmtOffset [+|-]hhmm] [-uncompThreads number_of threads] [-output dir_path]`

Table 2 describes the available options:

Table 2 - CMPG options

Option	Arguments	Description	Required/optional
`-filename`	<input_file>	Specifies the input filename. To specify multiple files then this option can be used repeatedly or wildcards can be specified. When multiple files are specified then it is up to the user ensure they are consecutive files from the same system.	REQUIRED
`-archive`	<FREQUENCY_1|FREQUENCY_2|FREQUENCY_3|FREQUENCY_4>	Specifies the sampling frequency that should be charted. If left blank then the user will be prompted.	OPTIONAL

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Option	Arguments	Description	Required/optional
-details	N/A	All detailed graphs are created as specified in the XML configuration.	OPTIONAL
-storage	<filename>	The filename supplied with this option contains output from the NetApp controller's storage command. This information is used to translate the long disk UIDs into the shorter format used in commands such as aggr show -r. The option is superfluous if using performance archive files. The script will automatically search for this file and therefore use this option to override this behaviour.	OPTIONAL
-raid	<filename>	The filename supplied with this option contains output from the NetApp controller's sysconfig -r command. The can be used to build pseudo RAID group counters from the existing disk counters. If the input file is an ASUP file then the -storage options *must* also be used. The script will automatically search for this file and therefore use this option to override this behaviour.	OPTIONAL
-logo	< logo_file >	Filename of a jpg to be placed in the top left of each graph.	OPTIONAL
-xml	< config_file >	Specifies a non-default configuration file to be used.	OPTIONAL
-metadata	< metadata_file >	Some CMDATA files do not contain meta-data. The script will automatically read from metadata.xml, if it exists, to gather this information. Use this option to override this and use a different file.	OPTIONAL
-perfInfo	N/A	Causes the script to dump out the performance meta-data contained within the CM data file. The output file is based upon the input file with -info.xml as a suffix.	OPTIONAL
-noPrompt	N/A	If a file already exists with the same name as the output file then this option will allow for it to be deleted without prompting.	OPTIONAL
-noDataAverage	N/A	Prevents data points from being averaged when multiple performance files are supplied. Can increase file size, and can also clutter data in large runs.	OPTIONAL
-analysis	N/A	Normal legends are replaced with selectable ones and standard deviation figures are added to the data sheets.	OPTIONAL

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Option	Arguments	Description	Required/optional
-gmtOffset	[+|-]hhmm	Timestamps for CMDATA files are recorded in GMT. The data files, however, do not say what time zone the controller is located in. Use this option to specify the controller's GMT offset to make the charts accurate. The local time zone is used by default.	OPTIONAL
-uncompThreads	Argument < number_of_threads > is optional to mention.	Enables multithreaded environment for uncompressing downloaded archive files. Any integer value representing number of parallel threads can be specified as argument to this option. • If this option is specified without any argument or not specified then the number of threads is handled by the application. • If this option is specified with an integer argument then number of threads will the minimum of the two values i.e. integer argument or number of processors in the system.	OPTIONAL
-output	<output_directory_path>	Specifies the output directory to which the final output file after processing the data should be placed. Currently only local and mapped drives supported. If the path contains directories with names having blank spaces in between then the whole path should be enclosed in double quotes.	OPTIONAL
-z	N/A	Enables printing of raw parsed output for Object, Instance and Counter hierarchy present in the cmpg input files into the generated excel file.	OPTIONAL
-version	N/A	Print version information.	OPTIONAL
-help	N/A	Print the option information.	OPTIONAL

Examples:

```
cmpg -f  <NetApp controller host name>\*.gz -x trend.xml

cmpg -f  <NetApp controller host name>\*.stats -nodataaverage

cmpg –f <NetApp controller host name>\*.stats –details

cmpg –f <NetApp controller host name>\*.xml –details

cmpg –f <system\system.zip>\*DF* -x df.xml

While processing 8.2 stats xml files, both data and info xmls should be
provided.
```


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In case of 8.2 Archive files, both meta files and data files should be present in the input directory. The meta filenames should end with ".ccma.meta" and data files in ".ccma.gz". The files when extracted from the filer, the filenames comply with the naming convention.

5.3 Supporting files with CMPG

The CMPG tool is distributed with the following supporting files:

- `cmpg.xml`: An XML file containing the default set of graphs that are created by the tool
- `perfInfo.xsl`: An XML style sheet used to view counter information produced by the `-p` options
- `metadata.xml`: The meta-data used when none can be located in a CMDATA file
- `cmdownload.exe`: Used to download the CMDATA files and other files from AutoSupport
- `alignment.xml`: Used with the `-x` options to create alignment output
- `archive.xml`: Used with the `-x` option to create archive output. Also used with the `-archive` option
- `cmpg.exe`: The main CMPG executable
- `df-trend.xml`: Used with the `-x` option to create space trending output
- `df.xml`: Used with the `-x` option to create space output
- `trend.xml`: Used with the `-x` option to create long term trending output
- `stor.xml`: Used with the `-x` option to create storage trending output

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6 Customizing CMPG

CMPG relies on an external XML configuration file for its charting specification. This configuration file tells CMPG what Microsoft Excel graphs to output and the performance counters that should be used to construct these graphs.

CMPG can output two different types of graphs and one type of data sheet. A set of system graphs are also included in every run of the tool and these cannot be customized.

6.1 OBJECT NAMESPACES

Object Namespaces are supported from CMPG 4.4 Onwards. The objects of the configuration xmls have unique namespaces defined. The cmpg code implicitly defines a set of predefined object namespaces while processing the xmls.

The list of objects such objects are:

- "fcache"
- "system"
- "disk"
- "processor"
- "ifnet"
- "vstorage"
- "nfsv3"
- "nfsv4"
- "target"
- "lun"
- "volume"
- "cifs"
- "fcp"
- "iscsi"
- "aggregate"
- "qtree"
- "quota"
- "vfiler"
- "ext_cache"
- "ext_cache_obj"
- "logical_replication_destination"
- "logical_replication_source"
- "dump"
- "ndmp"
- "hostadapter"
- "audit_ng"
- "spinhi"
- "incpr_global"
- "incpd_global"
- "raid"
- "perf"
- "replication"

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- "volume_snapmirror_source"
- "volume_snapmirror_destination"
- "cpu_all"
- "pam"
- "diskloop"
- “net”

So, the default xmls provided with the tool do not require any modification.

If there is a need to add a new object to the xml which is not part of this list the namespace has to be add it to the root tag ("config") of the xml by the user as:

```
<config file-suffix="perf" xmlns:net="http://www.w3.org/TR/html4/net">
```

Here net is the new object used and is not in the predefined object list.

6.2 System graphs

The Protocols and CPU Averages, Data Throughput (Inbound), and Data Throughput (Outbound) graphs are included by default.

The following are examples of the three default graphs:

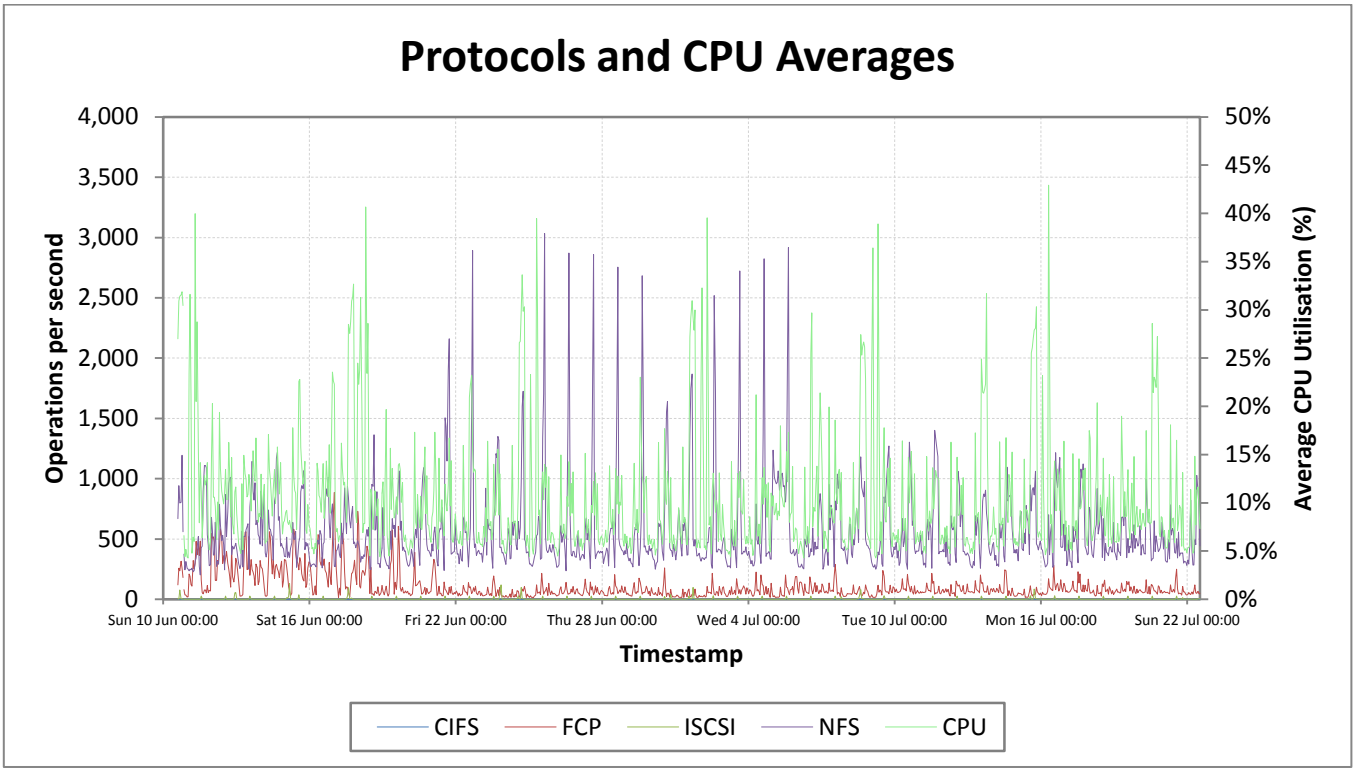

Figure 1 - Protocols graph

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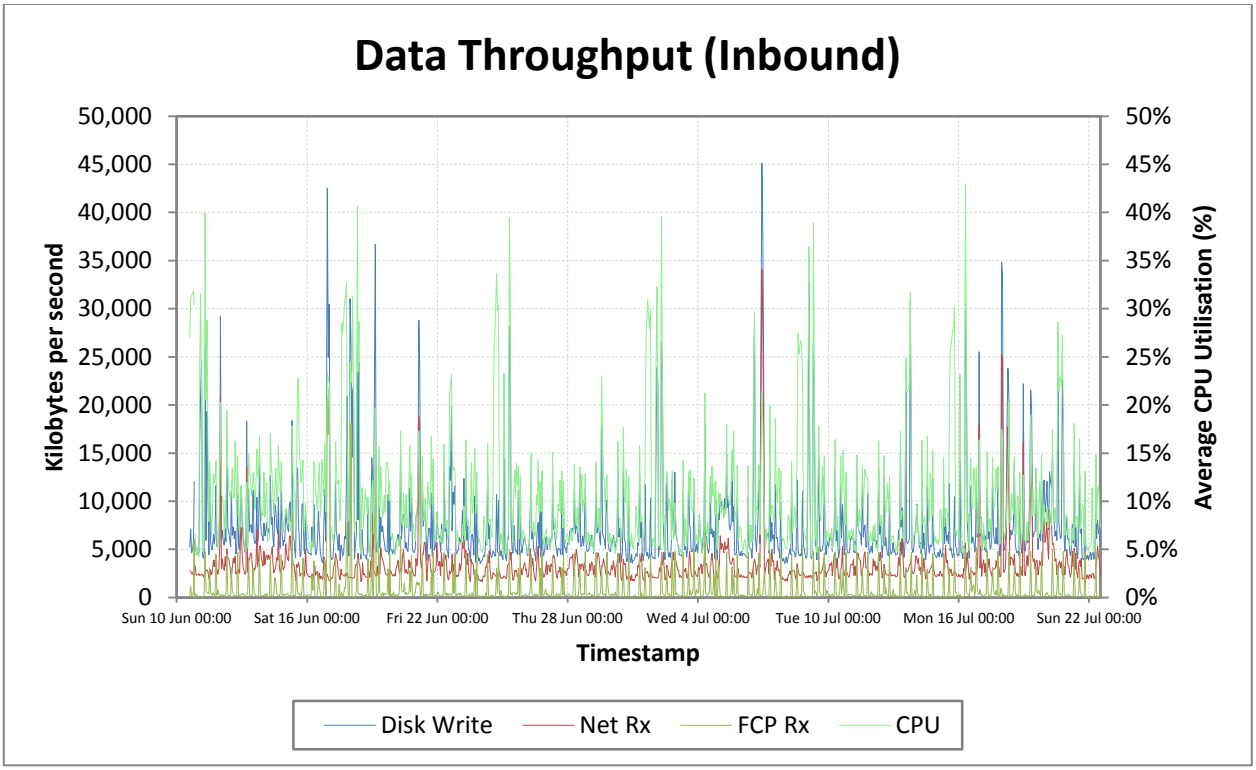

Figure 2 - Inbound data throughput

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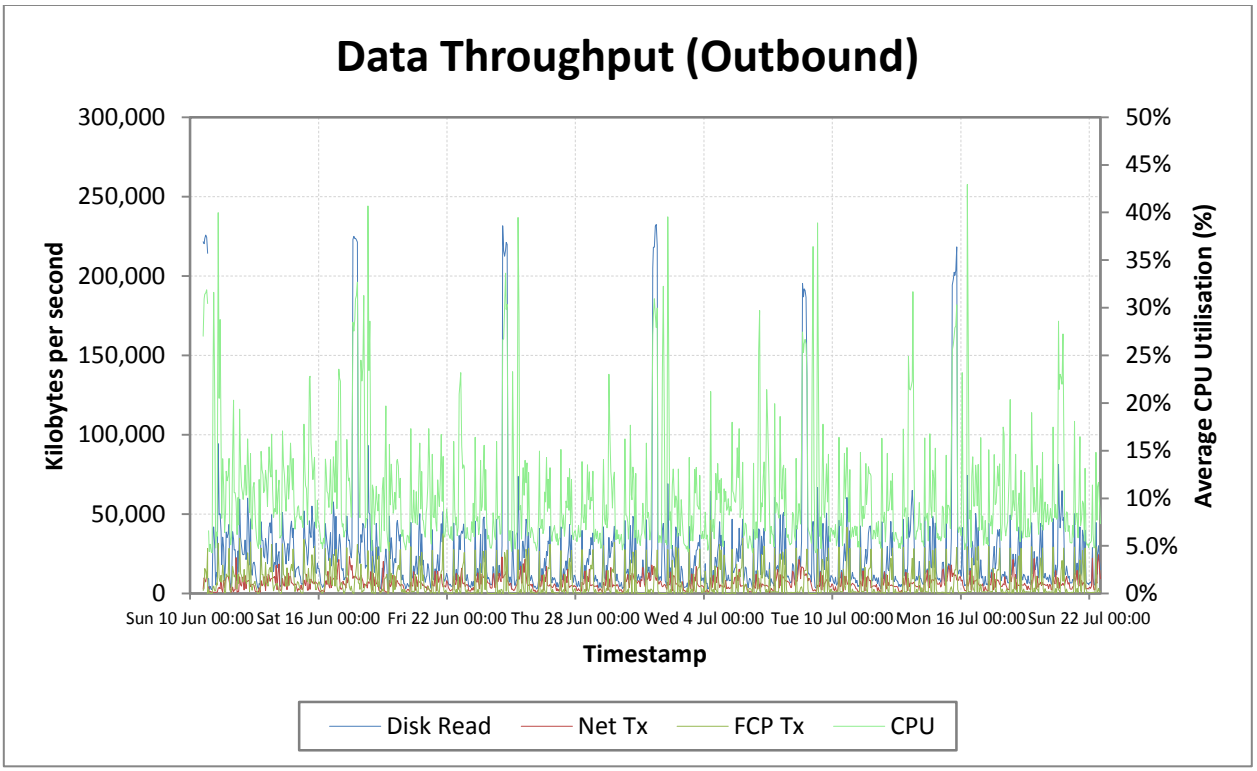

Figure 3 - Outbound data throughput

6.3 Overview graphs

Overview graphs are used to display counters from multiple objects of the same type on a single graph to enable relative correlations. For example between NIC throughput or volume latency. It is a best practice to keep the number of counters to a minimum since there can be many objects of a single type within a system.

The overview graph is specified in the XML configuration by using the <overview-graph> tag. For example:

```
<config>
<overview-graph title="Top 5 LUN Reads" type="lun" axis-title="Bytes per second" max-series="5"
disk-scrub="0" thin-series="0">
              <counters read_data=""/>
       </overview-graph>
       …
<config>
```

Table 3 shows the options that can be specified in a overview graph:

Table 3 - Overview graph options

Option	Description
`title`	This is the title of the graph. This is also used to form the name of the graph

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Option	Description
`type`	This specifies the type of object to be graphed The valid values for this option are: system, disk, processor, ifnet, nfsv3, target, lun, volume, cifs, fcp, iscsi, aggregate, qtree, vfiler, logical_replication_destination, logical_replication_source and dump Note: Many objects send only a limited number of counters in basic mode and some send no counters at all
`axis-title`	The title of the left axis. This defaults to “Operation per second” if no title is specified
`max-series`	Specifies the maximum number of series to show on the graph. The series are ordered and then the least significant ones are removed until max-series is reached. The valid values for this option is any whole number above 0
`disk-scrub`	With this option specified the scale of the graph is recalculated to ignore the first 10 timestamps. This should prevent the regular disk scrubbing process from skewing the scale. The valid values for this option are 0 and 1
`thin-series`	This option removes any series from a graph when the total of the series values is zero. For example, a protocol that is not in active use; the valid values for this option are 0 and 1

The <overview-graph> should contain a <counters> tag. The <counters> tag should contain at least a pair of counter name and counter title pairs. Counter name is the CM counter name which comes in the CM data file. See the Additional counters section to understand the counters present in the CM data file.

A counter title is used to generate the name for a series in a graph. If a counter title is empty, the series name contains only the instance name for the counters.

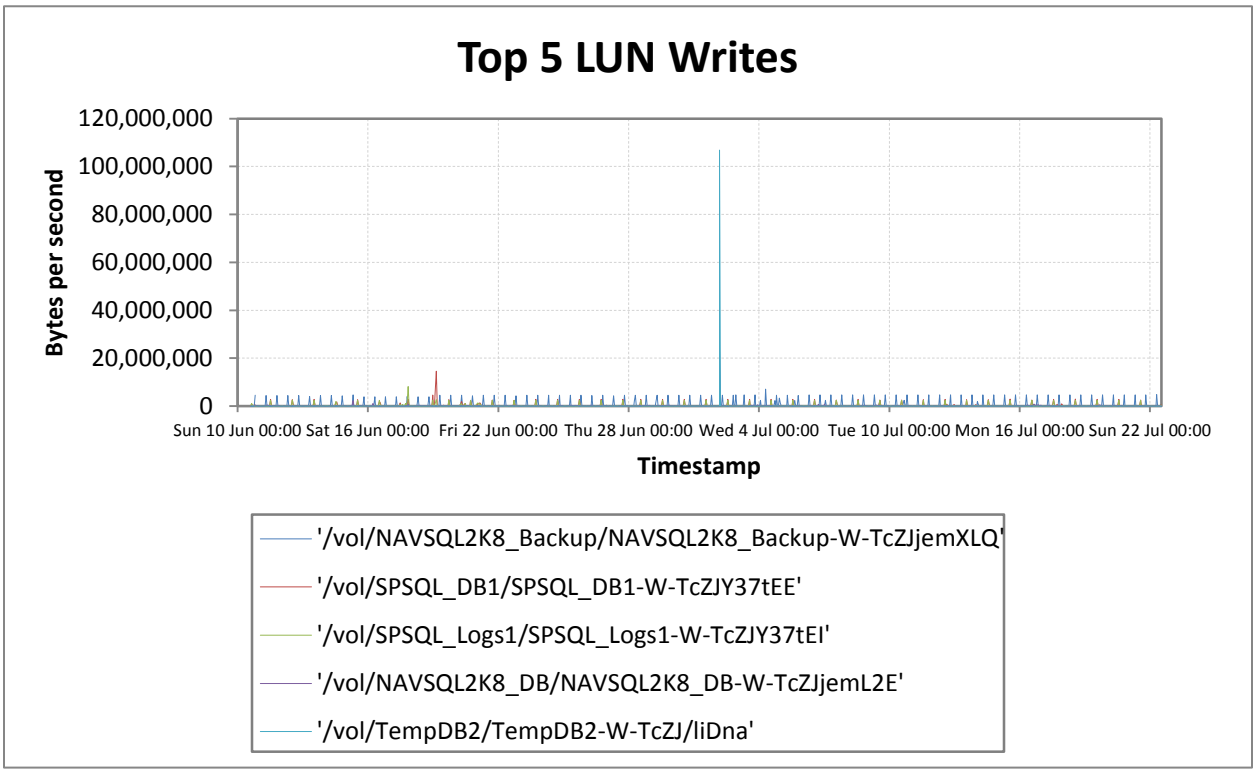

Figure 4 - Example overview graph

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6.4 Detail graphs

Detail graphs are used to display multiple counters for object instances of a single type. Each instance is plotted on a single graph; allowing for more counters to be specified without complicating the output.

The detail graph is specified in the XML configuration by using the `<detail-graph>` tag. For example:

```
<config>
      <detail-graph title="Vol %s" type="volume" axis-title="Bytes per second">
            <counters read_data="Reads" write_data="Writes" avg_latency="Average
Latency"/>
            <secondary-axis title="Latency (ms)" counters="avg_latency"/>
      </detail-graph>
      …
</config>
```

Note: Detail graphs are only created if the `-detail` option is specified in the command line.

Table 4 shows the options that can be specified in a Detail graph:

Table 4 - Detail graph options

Option	Description
title	This will be the title of the graph. This will also be used to form the name of the graph
type	This specifies the type of object that is to be graphed. The valid values for this option are: system, disk, processor, ifnet, nfsv3, target, lun, volume, cifs, fcp, iscsi, aggregate, qtree, vfiler, logical_replication_destination, logical_replication_source and dump. Note: Many objects send only a limited number of counters in basic mode and some send no counters at all
axis-title	The title of the left axis. This defaults to “Operation per second” if no title is specified

The `<detail-graph>` tag must contain a `<counters>` tag. The counters tag itself must contain at least one pair of counter name and counter title pairs. The counter title is used to generate the name for a series in a graph. If counter title is empty then the series name contains only the instance name for the counters.

An optional `<secondary-axis>` tag for the detail graph is also available. This option allows counters with different measurement units or drastically different scales to be plotted on the same graph. The following options can be specified for this tag:

Table 5 shows the options that can be specified for `<detail-graph>` tag.

Table 5 - Detail graph additional options

Option	Description
secondary axis title	This will be the title of the secondary axis
counters	This option specifies the comma separated list of counters that should be graphed on the secondary axis.

The following figure shows an example of a detail graph:

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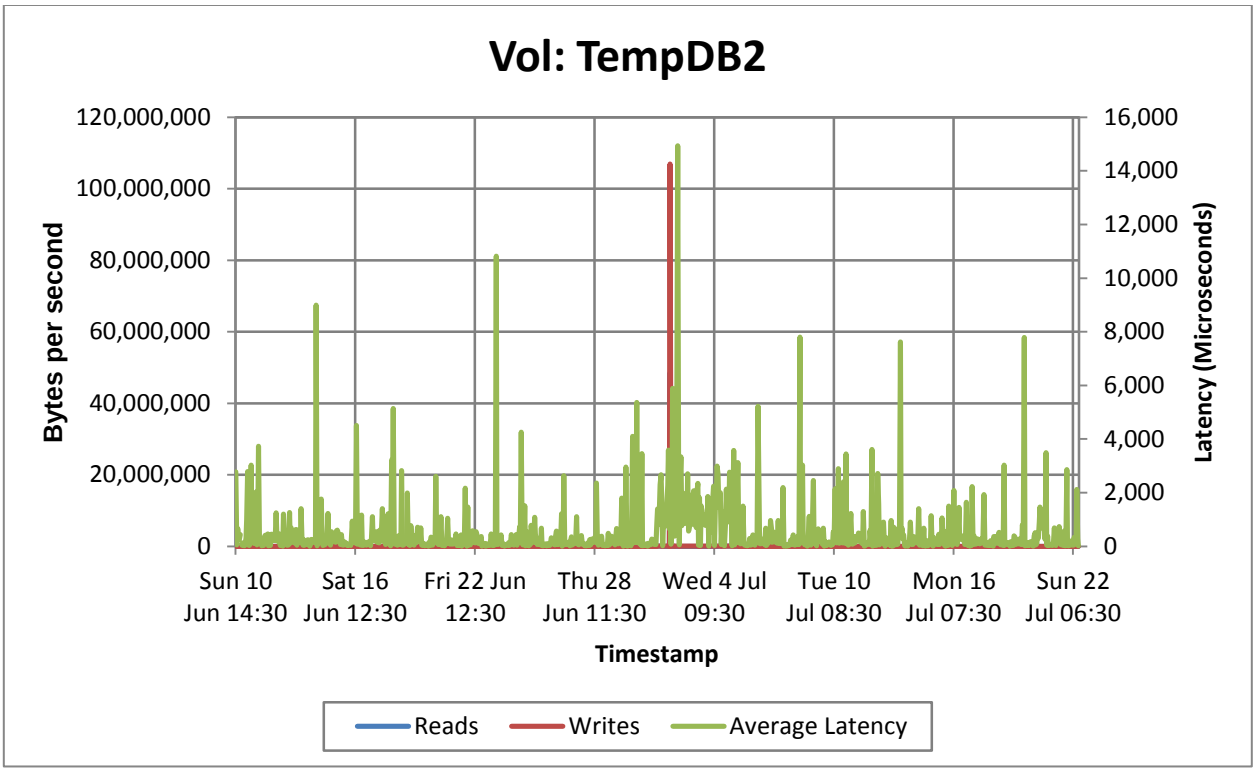

Figure 5 - Detail graph

6.5 Data sheet

A data sheet provides minimum, maximum, and average values for specified counters for each instance of an object type in a tabular format.

The data sheet is specified in the XML configuration by using the `<data-sheet>` tag. For example: -

```
<config>
      <data-sheet title="ProtocolStats" type="system">
            <counters cifs_ops="CIFS Ops." nfs_ops="NFS Ops." fcp_ops="FCP Ops."
isci_ops="ISCSI Ops."/>
      </data-sheet>
…
</config>
```

Table 6 shows the options that can be specified for Datasheet.

Table 6 - Datasheet options

Option	Description
`title`	This is the name of the worksheet. This is limited to the 32 characters and cannot contain certain special characters
`type`	This specifies the type of object that is to be graphed The valid values for this option are: system, disk, processor, ifnet, nfsv3, target, lun, volume, cifs, fcp, iscsi, aggregate, qtree, vfiler, logical_replication_destination, logical_replication_source and dump. Note: Many objects send only a limited number of counters in basic mode and some send no counters at all.

Similar to the graphs; each `<data-sheet>` tag must contain a `<counters>` tag. The counters tag itself must contain at least one pair of counter name and counter title pairs.

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	A	B	C	D	E	F	G
1	Instance	Stat.	CIFS Ops.	NFS Ops.	FCP Ops.	ISCSI Ops.	
2	system	min	35.7	0.0	19.3	0.0	
3		avg	641.6	0.0	990.2	0.0	
4		max	2,429.4	0.0	3,272.7	0.0	
5							

Figure 6 - Example Data sheet

6.6 Additional counters

Executing the tool with the `filename` and `perfInfo` option produces an XML file that contains all the information regarding the counters available within the CM data file. This file can then be opened in a browser. For example:

```
cmpg.exe -f CM-HOURLY-STATS.gz -p
```

This produces an XML file that resembles the following when opened in a browser:

```
+system object
+disk object
-processor object
    -processor_busy
        Description: Percentage of elapsed time that the processor is executing non-idle processes
        Properties:  percent
        Units:       percent
+ifnet object
+nfsv3 object
+target object
+lun object
+volume object
+cifs object
+fcp object
+iscsi object
+aggregate object
+qtree object
```

Figure 7 - CM Data Counter information

All counters listed for a specific object are available to be graphed. Diagnostic mode counters are not normally available and are therefore normally hidden in the XML document. The known exception is the `domain_busy` counter which is only available in Data ONTAP v. 7.2.4.

Counters that consist of an array of values are accessed by using a colon after the counter name and then the label name of the sub counter. For example, the diagnostic counter `nfsv3_op_count` contains an array of operations.

```
-nfsv3 object
      nfsv3_op_count
Description:  Array of select NFS v3 operation counts
Properties:   delta
Units:        none
Type:         array
Labels:       null, getattr, setattr, lookup, access, readlink, read, write, create,
              mkdir, symlink, mknod, remove, rmdir, rename, link, readdir, readdirplus,
              fsstat, fsinfo, pathconf, commit
```

Sub counters can be accessed in this format: `nfsv3_op_count:getattr`

Note: A feature in Internet Explorer, Mozilla Firefox 3.0 prevents an XML file from displaying properly. Use Firefox or Chrome to view the files

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7 Default graphs

In a default configuration, the CMPG tool produces a number of graphs which are explained below.

The default configuration is picked up by CMPG when no specific configuration file is specified using –xml option while invoking CMPG from command line interface.

Table 7 - Overview graphs

Graph	Description
Protocols	Shows the average activity of the different protocols on the storage controller. This information is super imposed on top of overall CPU utilisation which is plotted on the secondary axis.
Operations Outbound	Shows the average activity of the outbound Ethernet and Fibre Channel interfaces against disk reads. This graph is also overlaid on top of average utilisation.
Operations Inbound	This graph is the opposite of the operation outbound graph and shows inbound activity against disk writes.
All Processors	Shows the average utilisation of each installed processor
v Filer units	Shows the average processor time that is allocated to each virtual filer configured on the storage controller. The availability is this graph is dependent upon the configuration of the storage controller.
Domain Usage	Shows the average time that each domain has been executing on any processor. The axis scale will vary according to the number of processors in the storage controller. The availability of this graph is dependent on the version of ONTAP installed on the storage controller.
All Disk IOps	Shows the average number of IO operations per disk in the system. This graph may not show all disks installed in the system due to limitations within Microsoft Excel.
NIC Receives	Shows the average amount of data received by each Ethernet interface in the storage controller. Interfaces that are part of a virtual interface or marked as down are not displayed.
NIC Transmits	Shows the average amount of data transmitted by each Ethernet interface in the storage controller. Interfaces that are part of a virtual interface or marked as down are not displayed.
FC Target Receives	Shows the average amount of data received by each fibre channel target interface in the storage controller. Series with no data are removed to improve clarity of the graph.
FC Target Transmits	Shows the average amount of data transmitted by each fibre channel target interface in the storage controller. Series with no data are removed to improve clarity of the graph.
Top 5 Vol Writes	Shows the average write activity for the 5 busiest volumes for writes
Top 5 Vol Reads	Shows the average read activity for the 5 busiest volumes for reads
Top 5 Volume Latencies	Shows average latency for the 5 busiest volumes for latency
Top 5 LUN Writes	Shows the average write activity for the 5 busiest LUNs for writes
Top 5 LUN Reads	Shows the average read activity for the 5 busiest LUNs for reads
Cluster Node Latency	The system read latency for Clustered ONTAP systems
PAM Impact	Provides Disk Reads per second for Clustered ONTAP systems
Spinhi Performance Report	Shows the performance of D-Blade interface

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Graph	Description
Cluster iSCSI_Lif Throughput	Shows the performance of ISCSI for Clustered ONTAP systems
Cluster FC Target Transmits	Shows the performance of FCP Read Operations for Clustered ONTAP systems
Cluster FC Target Receives	Shows the performance of FCP Write Operations for Clustered ONTAP systems
Cluster FCP Latency	Shows the FCP Read, Write and Other latency for Clustered ONTAP systems
Cluster NFS ops	Shows the NFS Operational Performance for Clustered ONTAP systems
Hybrid Aggr Reads	Shows the WAFL Read Operational Performance for Clustered ONTAP systems
Hybrid Aggr Writes	Shows the WAFL Write Operational Performance for Clustered ONTAP systems

Table 8 - Detail graphs

Graph	Description
iSCSI	Shows average iSCSI reads and writes against iSCSI operations
LUNs	Shows the average read, write and average latency for each configured LUN on the storage controller
Volumes	Shows the average read, write and average latency for each volume on the storage controller

Table 9 - Data Sheets

Graph	Description
LUN Stats	Shows the minimum, average and maximum values for reads, writes and average latency
Volume Stats	Shows the minimum, average and maximum values for read operations, write operations and average latency
Input Stats	Shows the minimum, average and maximum values for Ethernet receives, Fibre Channel receives and disk writes
Output Stats	Shows the minimum, average and maximum values for Ethernet transmits, Fibre Channel transmits and disk reads
Protocol Stats	Shows the minimum, average and maximum values for the CIFS, HTTP, iSCSI, NFS and FCP protocols

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Appendix A. Document information

This appendix represents information about this document and includes Distribution, version control, and references.

A.1 Distribution and version control

A.1.1 Distribution

Table 10 - Distribution

Name	Role
Martin Szymczak	SE Program Office - Tools Manager (Netapp USA)
Mark Sibert	Engineering Manager
General	Professional Services Community (NetApp)

A.1.2 Document version control

This section contains the version control details for this document.

Table 11 - Document version information

Date	Change reference	Author	Version	Sections affected
August 2008	Document Created	Warren Barnes	Draft	All
July 2011	Updates for v4.2.28	Navneet Singh	1.0	All
November 2011	Updates for v4.3.0	Navneet Singh	1.1	3, 5
August 2012	Updates for v4.4.0	Kallol Roy	1.2	2, 5, 6
August 2012	Updates for grammer, 2012, and Excel 2010	Martin Szymczak	1.3	All
August 2012	Updates Section 3 from CmDownload and CMPG	Kallol Roy	1.4	3
September 2012	Updates Sections 4 and 6 for CMPG 4.4.1	Kallol Roy	1.5	4,6
November 2012	Updates Sections 3 and 7	Kallol Roy	1.6	3,7
November 2012	Updates Sections 3 and 4	Kallol Roy	1.7	3,4
November 2012	Updates Section 1,2,3,4,7 Correcting general terms	Kallol Roy	1.8	1,2,3,4,7
December 2012	Updates CMPG version to 4.4.3	Kallol Roy	1.9	1, 3, 4
June 2013	Updates Section 3 for CmDownload 3.0	Kallol Roy	2.0	3
July 2013	Updates for CMPG 4.4.4 and CmDownload 3.1	Kallol Roy	2.1	1,3,5

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Date	Change reference	Author	Version	Sections affected
August 2013	Updates for CMPG 4.4.4 Ontap 8.2 Support	Kallol Roy	2.2	5
August 2013	Updated CMPG support for Ontap 8.2 Support	Kallol Roy	2.3	5
September 2013	Updated document for CMPG 4.4.5 and CmDownload 3.2	Kallol Roy	2.5	3
December 2013	Updated document for CMPG 4.4.6 and CmDownload 3.3	Kallol Roy	2.6	3

A.2 References

1. Please use the –help command option in CmDownload and CMPG to obtain command syntax information.
2. Using the help CMPG communities page:

   https://communities.netapp.com/community/netapp_partners_network/netapp_tools/assessment_tools/counter-manager-performance-grapher-(cmpg)

   Please provide the following information to assist in troubleshooting your issue:
   - OS Version
   - Office version
   - Hostname used/requested
   - Command line used/requested
   - Upload the *_Console.log file present in the log directory of your input directory
   - Upload the *_Log.log file present in the log directory of your input directory

3. NetApp internal users can obtained more information at the CMPG Wiki page:

   http://wikid.netapp.com/w/CMPG

4. Feedback : https://communities.netapp.com/community/netapp_partners_network/netapp_tools/assessment_tools/counter-manager-performance-grapher-(cmpg)
5. Support: Raise defects for our support at http://track.netapp.com/Ticket.aspx?pid=26

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