

CMPG

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1.0 Introduction

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

The output file is in the form of a Microsoft Excel workbook. The graphs and data sheets within the workbook can be used for high level performance analysis. The workbook also forms part of the input into the [Performance Consulting Service](#).

Currently the tool is only available as an executable for Microsoft Windows platforms as it relies heavily on Windows features to drive the automation of Microsoft Excel. It has been successfully tested with Excel2007 and Excel2010. Support for Excel2003 has been dropped as of v4 due to the limitations of this version of Excel.

1.1 Getting CMPG Input Data Files

There are many ways to access the CM data required to generate performance graphs

1. NetApp users with NetApp intranet access can download from the [NGS AutoSupport Search Tool](#). You must search using either the **Hostname** or the **Sys ID**.
2. NetApp users with NetApp intranet access can also use the [cmdownload](#) tool which can download CM data and other supporting files from NetApp's AutoSupport repository. This tool is included in the CMPG download
3. Download directly from a running NetApp controller. For Data ONTAP 7.x systems, the CM data files are located at **/etc/log/cm_hourly_stats_done** , the location for Data ONTAP 8.x systems is **/etc/log/cm_stats_hourly**. This file is compressed and doesn't need uncompressing for use with CMPG. Please remove the dot from the start of this file before processing with CMPG.

You can also use CMPG to process data from performance archive files. These files must be downloaded directly from a NetApp controller and are located:

- in Data ONTAP 7.3: /etc/stats/archive
- in Data ONTAP 7.3.2+: a symlink made from /etc/log/stats/archive to /etc/stats/archive
- in Data ONTAP 8.0+: /etc/log/stats/archive

2.0 Usage

CMPG is a Perl based script that is executed from the command line. For example:

```
cmpg.exe -filename CM-HOURLY-STATS.gz
```

or

```
cmpg.exe -filename stats_archive_XXX_YYY_ZZZ.gz -archive
```

The following CMPG command line options are available: -

`-filename input-file`

Specifies the input filename. You can graph longer periods by entering more files. You can do this by either specifying `-f` multiple times or using wildcards. An example being: `cmpg -f netapp01\*.gz`. This works for either CM data files or performance archive files. You can easily download multiple CM data files using `cmdownload`.

`-archive [FREQUENCY_1|FREQUENCY_2|FREQUENCY_3|FREQUENCY_4]`

CMPG input is in performance archive format and optionally allows you to specify which sampling frequency within the file to chart. The defaults are `FREQUENCY_1` = once per second, `FREQUENCY_2` = once per 5 seconds, `FREQUENCY_3` = once per minute and `FREQUENCY_4` = once every 5 minutes. Lower sampling frequencies take more time to process and require more memory. Note that not all counters are sampled at the lowest frequencies. The NFS operations histogram is one example.

`-details`

All detailed graphs are created.

`-metadata meta-data-file`

On some occasions meta-data is missing from CMDATA files and this prevents meaningful data from being extracted and graphed. As of 3.0.2 the script will automatically use the file `metadata.xml`. This should suffice for most situations, but this behaviour can be overridden, if needed, using this option.

`-storage [storage-file]`

The filename supplied with this option contains output from the filer's `storage` command. If you do not specify the file name then the script will attempt to locate a file ending with 'STORAGE' or 'storage.txt' in the same directory as the data files. This is only applicable for CMDATA files.

`-raid [sysconfig-r-file]`

The filename supplied with this option contains output from the filer's `sysconfig -r` command. If you do not specify the file name then the script will attempt to locate a file ending with 'SYSCONFIG-R' or 'sysconfig.txt' in the same directory as the data files. This is only applicable for CMDATA files.

`-logo image-file`

This option specifies the filename of a image that will be inserted into the top left corner of the graphs

`-xml xml-config-file`

The name of a custom configuration file to use for producing graphs. By default CMPG uses `-x cmpg.xml`

`-perfInfo`

Causes CMPG to dump out the performance information contained within the CM data file. The output file is based upon the input file with `-info.xml`.

`-noPrompt`

Deletes an output file if it already exists

`-noDataAverage`

Prevents data points from being averaged out when multiple performance files are supplied.

`-gmtOffset [+|-]hhmm`

Timestamps for CM data 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.

`-analysis`

Normal legends are replaced with selectable ones and standard deviation figures are added to the data sheets.

`-uncompThreads [number_of_threads]`

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 then the number of threads default to the number of processors.
- If this option is specified with an integer argument then the numbers of threads is the minimum of the two values i.e. integer argument or number of processors in the system.
- If this option is not specified then the number of threads defaults to the value 1.

`-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 are supported. If the path contains directories with names having blank spaces in between then the whole path should be enclosed in double quotes.

`-version`

Print the version information

`-help`

Print the help information

All options can be shortened as long as no ambiguity exists. For example: `-filename` can be shortened to `-f`.

2.1 Supporting Files

The CMPG tool is distributed with these supporting files:

1. `cmpg.xml` An XML file containing the default set of graphs that are created by the tool
2. `perfInfo.xml` An XML style sheet used to view counter information produced by the `-p` options
3. `metadata.xml` The meta-data used when none can be located in a CMDATA file
4. `cmdownload.exe` Used to download CMDATA files and other files from NetApp's AutoSupport repository
5. `alignment.xml` Used with the `-x` options to create alignment output
6. `archive.xml` Used with the `-x` option to create archive output. Also used with the `-archive` option
7. `cmpg.exe` The main CMPG executable
8. `df-trend.xml` Used with the `-x` option to create space trending output
9. `df.xml` Used with the `-x` option to create space output
10. `trend.xml` Used with the `-x` option to create long term trending output

2.2 CMPG Usage Steps

CMPG/CMDownload Best Practice Installation Steps

Download CMPG into a unique directory on your PC that has a short path, such as the `c:\cmpg` directory.

Extract the .ZIP file into this directory.

Find 'My Computer' on your desktop, and right click it, go into Properties, Advanced tab, and then Environment Variables

In the System Variables window, select "Path", and then click on Edit.

We want to grow this variable, using a semicolon to add a new directory path to the end of the existing statement. Please add your cmpg directory, eg., `;c:\cmpg`. Hit save, and exit these windows. Don't forget to add the semi-colon between path entries.

Open a new- DOS prompt/window, and enter the command `CMPG`. You should see CMPG command output as a result. DOS windows that exist before these steps, will not have `cmpg/cmdownload` in it's path and will not work.

2.2.2 CMPG Basic Options and Usage Examples

- 1) **Download and graph 4 weeks of performance data using `cmdownload` (requires NetApp intranet access)**

Downloads CM-STATS.gz and configuration metadata for the last four weeks to subfolder that matches the storage controller's name

```
cmdownload -f <filename or sysid> -w 4
```

Or if you are using serial numbers

```
cmdownload -s <serialnumber> -w 4
```

Uncompress the .gz downloaded files before using thwm with cmpg.

```
cmpg -f <filename>\*.stats -nodataaverage
```

Note: the -nodataaverage stops data points being averaged and peaks being hidden

```
cmpg -f <filename>\*.stats -details
```

The -details flag is needed to include individual loop charts, and expose performance charts per volume and per lun

```
cmpg -f <filename>\*.stats -output Z:\cmpg\resultDirectory
```

The -output flag can be used to place the result file into the specified destination directory, which can be a network path mapped as Win

Note: Internet Explorer has a habit of automatically uncompressing the GZIP file downloaded from ASUP search and leaving the .gz extension. If you have problems uncompressing the file then just open it in a text editor and see if you can see plain text.

2) Download and graph the last 24 weeks performance data

```
cmdownload -f <filename or sysid> -w 24
```

Or if you are using serial numbers

```
cmdownload -s <serialnumber> -w 24
```

```
cmpg -f <filename>\*.stats -x trend.xml
```

3) Download and graph the last 24 weeks space utilization

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

Or if you are using serial numbers

```
cmdownload -s <serialnumber> -w 24 -c DF -c DF-A -c DF-S -c DF-R -zip  
cmpg -f <system\system.zip>\*DF* -x df.xml
```

4) Download and project storage growth for aggregate and volumes for the last 52 weeks

```
cmdownload -f <system> -w 52 -c DF -c DF-A -c DF-S -c AGGR-STATUS -zip  
cmpg -f <system\system.zip> -x df-trend.xml
```

5) Download and graphs LUN alignment for a system

```
cmdownload -f <filename or sysid>  
cmpg -f <filename>\*.stats -x alignment.xml
```

This can produce a large number of charts and it can be laborious to search for bad alignment. Please see section 2.3.3 for the excel macro that can be used to hide all the charts with good alignment leaving only charts that indicate bad alignment.

Note: the recent slides on LUN Misalignment are [here](#)

6) Get the Performance Archiver data from a filer running 7.3.x

All of the examples here can be run with these files using the –archive option at the end of CMPG.

In ONTAP 7.3: /etc/stats/archive/

In ONTAP 7.3.2+: a symlink made from /etc/log/stats/archive to /etc/stats/archive

In ONTAP 8.0+: directory moved from /etc/stats/archive to /etc/log/stats/archive

Note: the performance archiver does not contain processor domain, LUN or FlexScale counters.

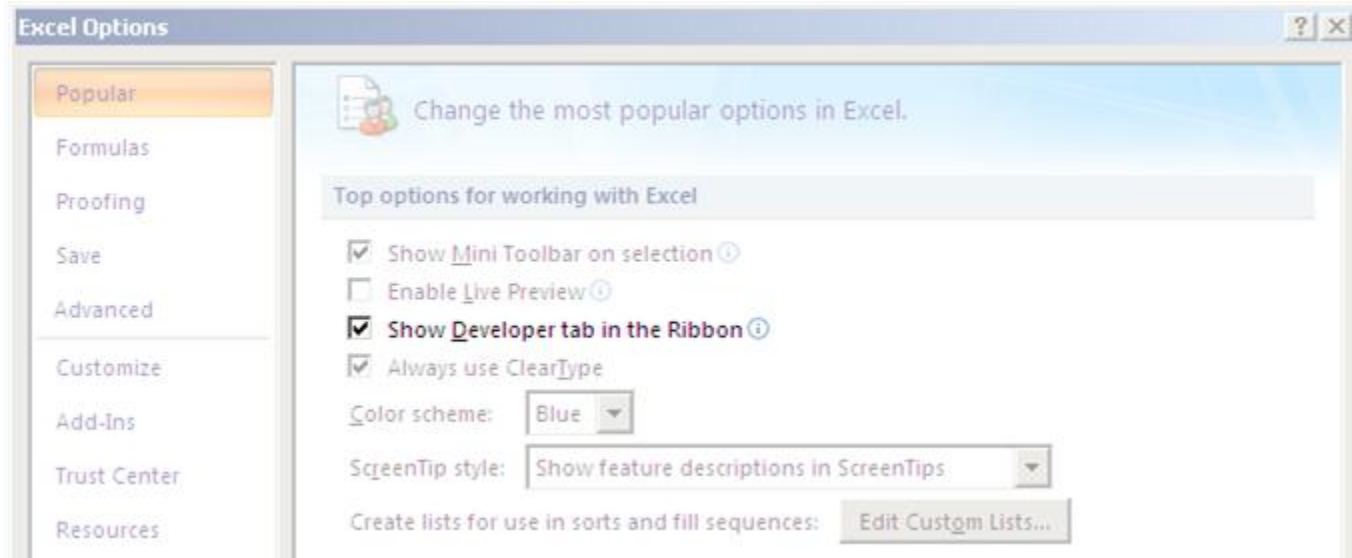
2.2.3 Simple Counter Manager Automation

This batch file will save the users having to open a DOS prompt and simplify cmdownload / CMPG use. Please [download](#) and save this 'scma-batch.bat' file to the CMPG working directory and create a shortcut to it on your desktop.

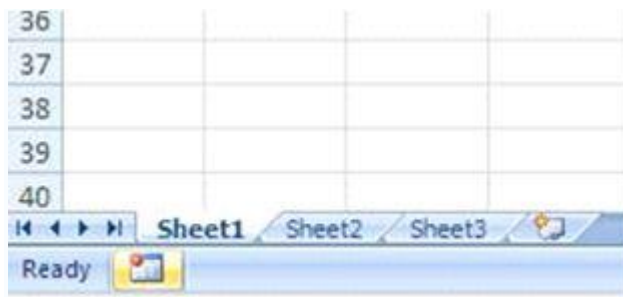
2.3 Excel Macro Customizations

There are a number of macros that generate nicely formatted CPMG workbooks. The following instructions show how to add these to your default Excel instance, so these Macros are loaded by default when Excel is opened. These instructions are for Excel 2007.

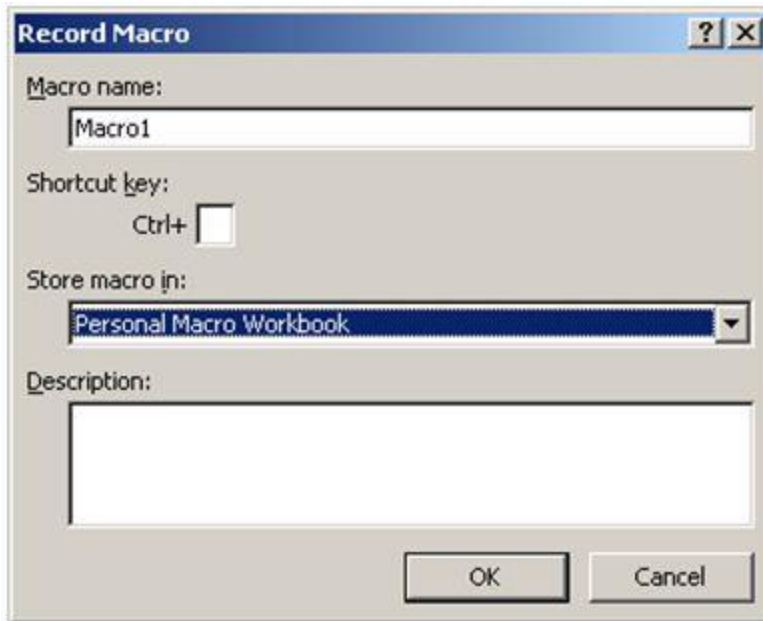
1. Enable the developer tools in Excel. Ribbon button>Excel Options. Then enable Developer Tools.



2. Now, record a macro.



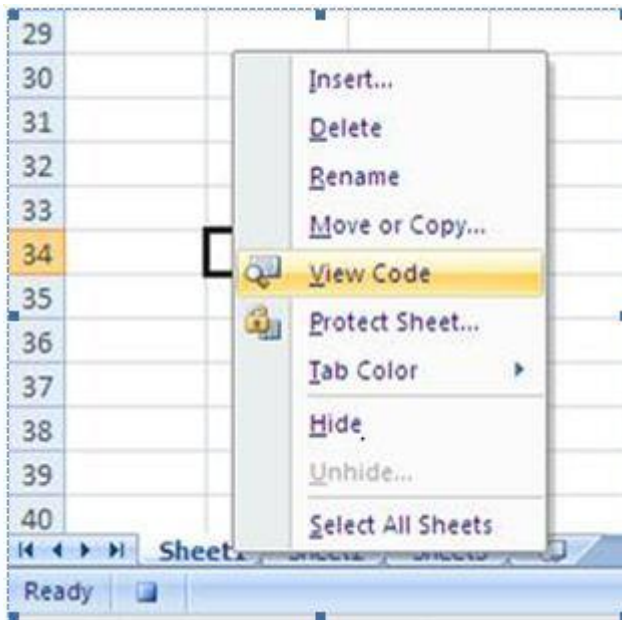
3. Store the macro in your **Personal Macro Workbook**.



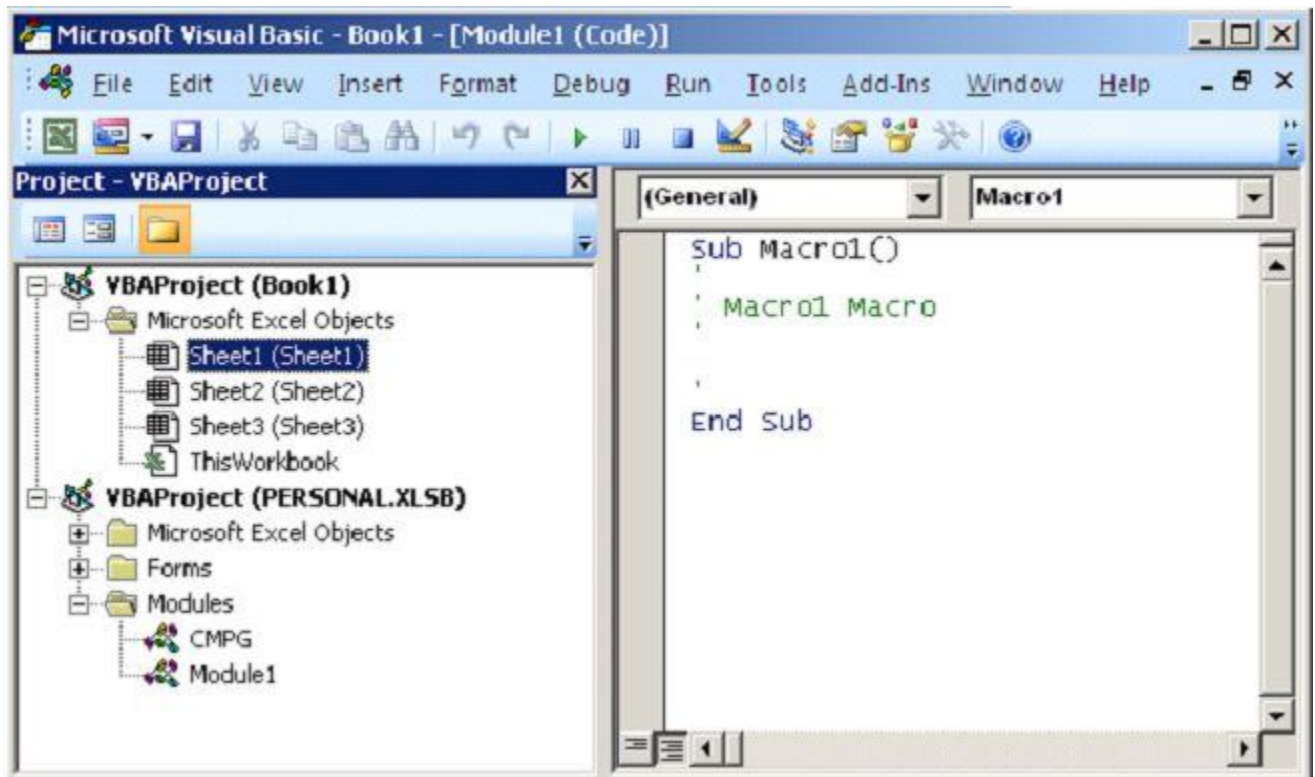
4. Stop the recording.



5. Right-click the sheet tab and go to the Visual Basic editor.



6. Double click on “Module1” and overwrite the macro with one of the macros below on the right-hand side.



2.3.1 Auto Zoom Macro

This macro allows you to automatically zoom all worksheets in the workbook to 75% and addresses viewing and screen resolution issues. Copy and paste the following using the instructions above: -

```
Sub SetZoom()  
  
    ' Declare the variables  
    Dim ac As Excel.Chart  
    Dim c As Excel.Chart  
  
    ' Record the active chart  
    Set ac = ActiveChart  
  
    ' Stop Excel updating stuff as it just slows the macro down  
    Application.ScreenUpdating = False  
    Application.Interactive = False  
  
    ' Select each chart and set the zoom level  
    ' Cannot use charts.select for some reason  
    For Each c In ActiveWorkbook.Charts  
        c.Select  
        ActiveWindow.Zoom = 75  
    Next  
  
    ' Make sure the original chart is now selected  
    ac.Select  
  
    ' Set these back  
    Application.ScreenUpdating = True  
    Application.Interactive = True  
End Sub
```

2.3.2 Reset Margins Macro

This macro automatically reset the margins on all worksheets in the workbook to 'narrow' as seen in the toolbar under Page Layout. This macro improves CMPPG chart generation because it no longer cuts off the right axis of the charts. Copy and paste the following using the instructions above:

```
Sub SetMargins()  
  
    ' Declare the variables  
    Dim ac As Excel.Chart  
    Dim c As Excel.Chart  
  
    ' Record the active chart  
    Set ac = ActiveChart  
  
    ' Stop Excel updating stuff as it just slows the macro down  
    Application.ScreenUpdating = False  
    Application.Interactive = False
```

```

' Select each chart and set the margins
' Cannot use charts.select for some reason
For Each c In ActiveWorkbook.Charts
ActiveSheet.PageSetup.LeftMargin = Application.InchesToPoints(0.25)
ActiveSheet.PageSetup.RightMargin = Application.InchesToPoints(0.25)
ActiveSheet.PageSetup.TopMargin = Application.InchesToPoints(0.75)
ActiveSheet.PageSetup.BottomMargin = Application.InchesToPoints(0.75)
ActiveSheet.PageSetup.HeaderMargin = Application.InchesToPoints(0.3)
ActiveSheet.PageSetup.FooterMargin = Application.InchesToPoints(0.3)
Next

' Make sure the original chart is now selected
ac.Select

' Set these back
Application.ScreenUpdating = True
Application.Interactive = True
End Sub

```

2.3.3 Aligned LUN Hide Macro

This macro will hide all the LUN charts that show alignment, and show all the misaligned LUNs that need closer attention. Copy and paste the following using the instructions above: -

```

Sub ShowBadAlignment()
' Don't care if we error
On Error Resume Next

' Stop the screen updating, might make little difference here
Application.ScreenUpdating = False

' Limits
Dim AlignLimit As Double
Dim OpsLimit As Double

' Only show charts if
AlignLimit = 0.8 ' Correctly aligned are less than this percentage
OpsLimit = 10    ' Operations per second is greater than this

' Set the variables
Dim c As Excel.Chart
Dim s As Series

' Loop through each chart in the current workbook
For Each c In Application.ActiveWorkbook.Charts

' Hide the sheet to start with
c.Visible = xlSheetHidden

Dim Align As Double
Dim Ops As Double

' Get the 0 bucket for the histogram

```

```

Set s = c.SeriesCollection("0")
' Is this a valid object?
If IsObject(s) Then
    ' Get the average value for the series
    Align = Application.WorksheetFunction.Average(s.Values)
End If

' Get the operations for the histogram
Set s = c.SeriesCollection("Ops.")
' Is this a valid object?
If IsObject(s) Then
    ' Get the average value for the series
    Ops = Application.WorksheetFunction.Average(s.Values)
End If

' Does this chart match the criteria?
If Align < AlignLimit And Ops > OpsLimit Then
    c.Visible = xlSheetVisible
    Debug.Print c.Name
End If

Next

End Sub

```

3.0 Customizations

CMPG relies upon an external XML file for configuration. The configuration tells CMPG what graphs to output and what counters should be used. CMPG can output two different types of graphs and one type of data sheet. Three default system graphs that are included in every run of CMPG and these default graphs cannot be configured.

3.1 System Graphs

The default graphs Protocols, Inbound Throughput, and Outbound Throughput are always included. The principal reason is that additional coding is required to place the CPU utilization area graph on the secondary axis and this cannot yet be specified in the XML configuration.

The following are examples of the three default system graphs: -

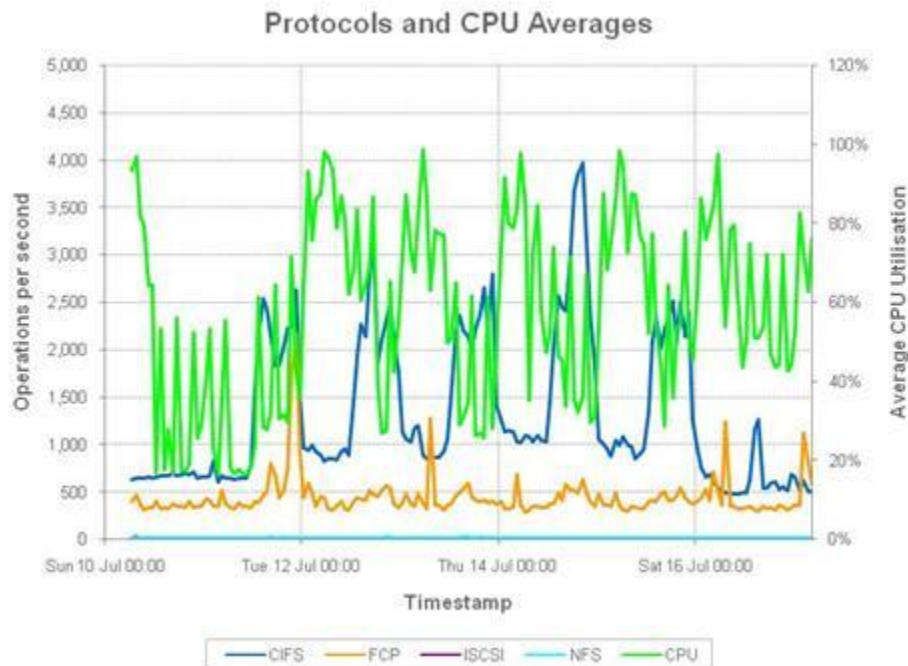


Figure 1: Protocols Graph

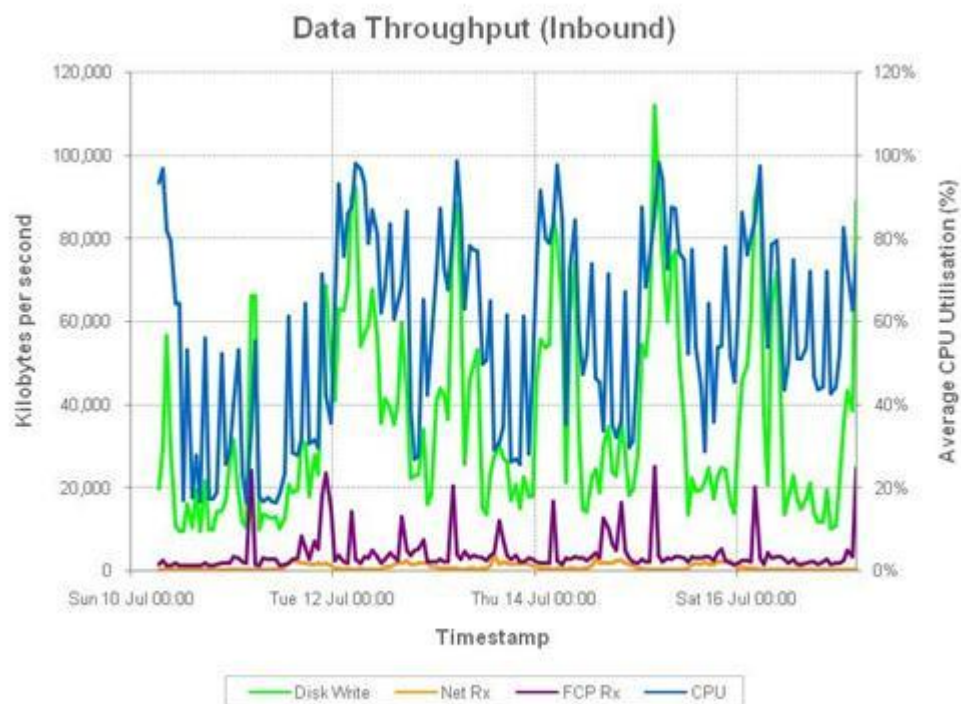


Figure 2: Inbound Throughput

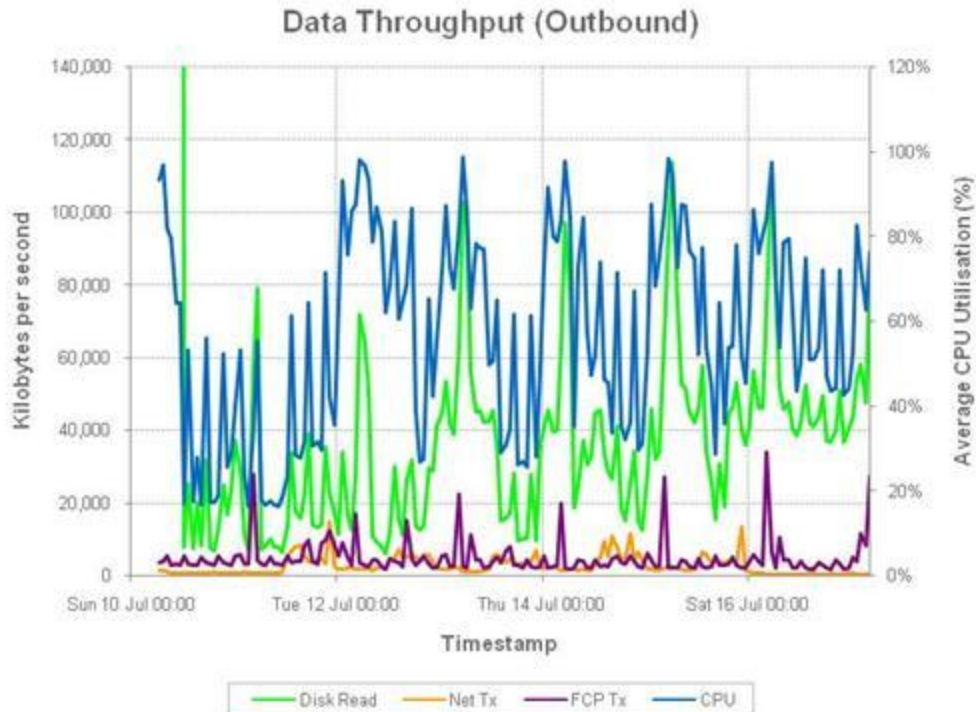


Figure 3: Outbound Throughput

3.2 Overview Graph

The overview graph is used to display counters from multiple objects of the same type on a single graph. For example, this allows for comparison between NIC throughput or volume latency. It is a good 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" max-series="5" remove-series="1" />

<counters lun:read_data=""/>

</overview-graph>

...

<config>
```

The following options can be specified for the overview graph: -

title : This will be the title of the graph. This will also be used to form the name of the graph

axis-title : The title of the left axis. This is automatically generated using the performance meta-data and is the units of the counter being used. Where multiple counters are used the predominant units will be used. Any title specified here will be prepended to the automatic title.

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

remove-series : With this option specified the scale of the graph is recalculated to ignore the first 7 timestamps. This should prevent the regular disk scrubbing process from skewing the scale

The valid values for this option are 0 and 1

The <overview-graph> 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 will contain only the instance name for the counters.

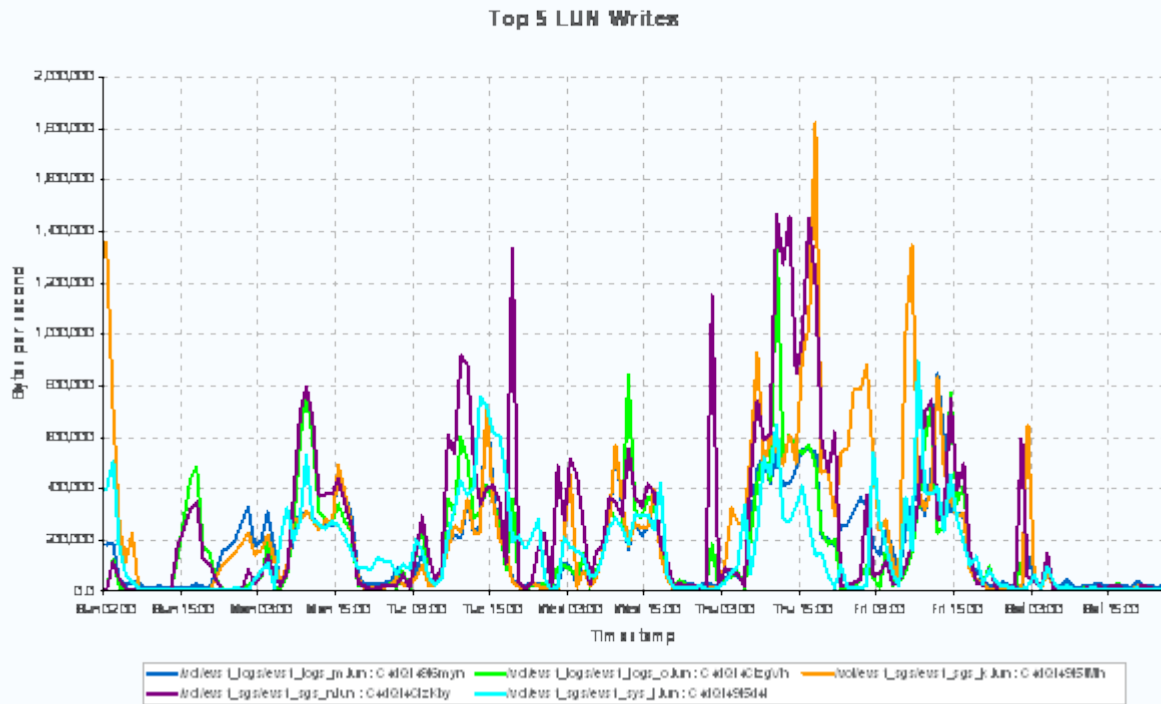


Figure 4: Overview Graph

3.3 Detail Graph

The detail graph can be used to display multiple counters for object instances of a single type. Each instance will be 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"/>
<counters
volume:read_data="Reads"
volume:write_data="Writes"
volume:avg_latency="Average Latency" />
<secondary-axis title="Latency" counters="volume:avg_latency"/>
</detail-graph>
...
</config>
```

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

The following options can be specified for the overview graph: -

title : This will be the title of the graph. This will also be used to form the name of the graph

title : The title on the top of each chart created. One chart per volume in the case. The %s in this example specifies cmpg to label the worksheet volume:<vol_name>

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 will contain only the instance name for the counters.

There is also an optional <secondary-axis> tag for the detail graph. This option allows for 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: -

title : The title of the right axis. This is automatically generated using the performance meta-data and is the units of the counter being used. Where multiple counters are used the predominant units will be used. Any title specified here will be prepended to the automatic title.

counters : This option specifies the comma separated list of counters that should be graphed on the secondary axis.

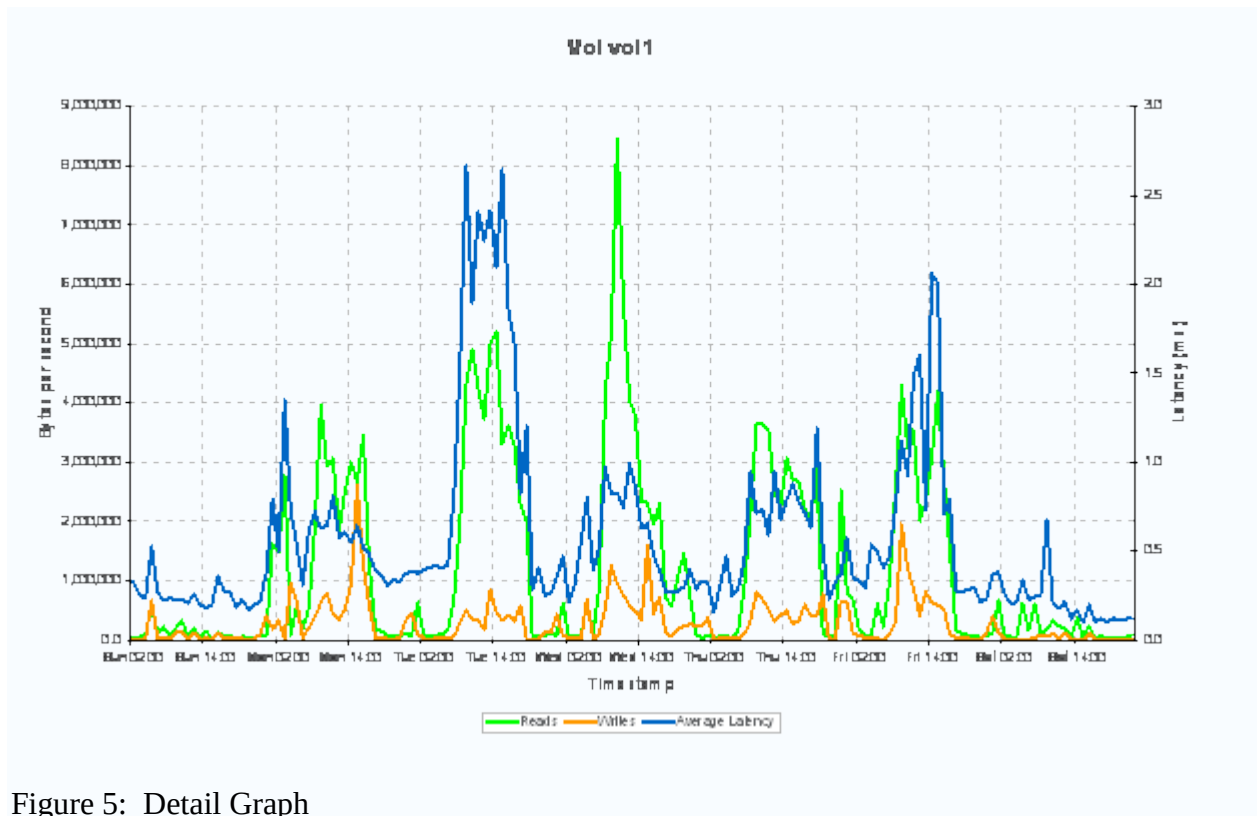


Figure 5: Detail Graph

3.4 Data Sheet

A data sheet will output 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">
<counters
system:cifs_ops="CIFS" />
system:nfs_ops="NFS" />
system:fcps_ops="FCP" />
system:iscsi_ops="iSCSI" />
system:http_ops="HTTP" />
system:cpu_busy="CPU" />
</data-sheet>
...
</config>
```

The following options can be specified for the overview graph: -

title : This will be the name of the worksheet. This is limited to the 32 characters and cannot contain certain special characters.

As with 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.

	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							
6							

Figure 6: Data Sheet

3.5 Additional Counters

Executing the tool with the filename and printInfo options will produce 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. First copy the CMPIG included file perfinfo.xml into the directory where your data resides, and then execute: -

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

Will produce an XML file that will resemble 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
+fcg object
+iscsi object
+aggregate object
+qtree object
```

Figure 7: CM Data Counter Information

Any of the counters listed for a specific object are available to be graphed. Overview graph with counters from different objects in the same worksheet can also be plotted. End user can modify the configuration XML accordingly to achieve the mentioned capability

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 available with ONTAP versions of 7.2.4 despite being labeled a diagnostic counter.

Counters that consist of an array of values are accessed by following the counter name with a colon 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
```

The sub counters can be accessed by the format nfsv3_op_count:getattr

Note

A feature in Mozilla Firefox 3.0 prevents the XML file from displaying properly. Either use Microsoft Internet Explorer or, in Firefox, navigate to the **about:config** page and change the option **security.fileuri.strict_origin_policy** to **false**

3.5.1 Artificial Counters

diskloop:user_read_throuhgput

The user_read_throuhgput is calculated as the total blocks read from each disk in a loop multiplied by the average chain length for the disk IO and then multiplied by 4. The figure gives throughput in kilobytes per second. Fabric MetroCluster systems will show throughput per switch port and not per FC initiator.

diskloop:user_write_throuhgput

The user_write_throuhgput is calculated as the total blocks written to each disk in a loop multiplied by the average chain length for the disk IO and then multiplied by 4. The figure gives throughput in kilobytes per second. Fabric MetroCluster systems will show throughput per switch port and not per FC initiator.

diskloop:cp_read_throughput

The cp_read_throughput is calculated as the total blocks read from each disk in a loop in order to satisfy user writes multiplied by the average chain length for the disk IO and then multiplied by 4. The figure gives throughput in kilobytes per second. Fabric MetroCluster systems will show throughput per switch port and not per FC initiator.

system:input_ratio

The input ratio is calculated as disk writes divided by the sum of network and fibre channel writes. Input ratio *should* vary between 0 and 1 with 1 being the ideal.

system:output_ratio

Output ratio is the disk reads divided by the sum of network and fiber channel reads. Output ratios *should* range from 1 upwards with higher numbers being ideal as they indicate higher cache hits.

3.5.2 Composite Counter

Composite Counters enables complex math to be done on counters and graphed as normal counters

```
<composite-counter name="concurrency" object="volume" unit="none">
```

```
<function type="add" counter="volume:total_ops"/>
```

```
<function type="product" counter="volume:avg_latency"/>
```

```
<function type="divide" value="1000"/>
```

```
</composite-counter>
```

3.6 Adding FLASH CACHE to the Archiver

Please follow these steps:

1. On 7.3 copy “default” file to a new file call “custom1.gz” in the same directory. “etc\stats\archive\preset”
2. On 8.0.1X24 the file location will be /mroot/etc/log/stats/archive/.preset
3. Extracted “custom1.gz” so you have “custom1” file in the directory.
4. Edit this file and add the following at some point. You don’t have to gzip it up again.

```
<object name="ext_cache_obj">

  <counter name="accesses" archive="FREQUENCY_1">

</counter>

  <counter name="hit" archive="FREQUENCY_1">

</counter>

  <counter name="hit_percent" archive="FREQUENCY_1">

</counter>

  <counter name="hit_normal_lev0" archive="FREQUENCY_1">

</counter>

  <counter name="hit_metadata_file" archive="FREQUENCY_1">

</counter>

  <counter name="hit_directory" archive="FREQUENCY_1">

</counter>

  <counter name="hit_indirect" archive="FREQUENCY_1">

</counter>

  <counter name="miss" archive="FREQUENCY_1">

</counter>

  <counter name="miss_metadata_file" archive="FREQUENCY_1">

</counter>
```

```
<counter name="miss_directory" archive="FREQUENCY_1">

</counter>

<counter name="miss_indirect" archive="FREQUENCY_1">

</counter>

<counter name="inserts" archive="FREQUENCY_1">

</counter>

<counter name="evicts" archive="FREQUENCY_1">

</counter>

<counter name="usage" archive="FREQUENCY_1">

</counter>

</object>
```

5. On the console do the following.

```
filer> options stats.archive.enable off

Fri Sep 11 08:12:22 GMT [perf.archive.stop:info]: Performance archiver
stopped.

filer> options stats.archive.preset.level custom1

filer> options stats.archive.enable on

Fri Sep 11 08:16:32 GMT [perf.archive.start:info]: Performance
archiver started. Sampling 21 objects and 203 counters.
```

6. Run this CMPG command
`cmpg -f <file> -archive -details`

4.0 Default Graphs

CMPG in its default configuration will produce a number of graphs which are explained below.

4.1 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 Filers	Shows the average processor time that is allocated to each virtual filer configured on the storage controller. The availability of this graph is dependant 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 dependant 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

4.2 Detailed 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

4.3 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

5.0 Troubleshooting

5.1 No performance meta-data

Symptom

CMPG reports that the performance meta-data is missing from the data file

Explanation

Occasionally the performance meta-data section of the CM stat file is missing. If the uncompressed file is opened using a text editor then the start of the file will look like: -

```
<perf-info></perf-info><perf-data>...
```

Resolution

The workaround is to find a CM stat file from a system with the same version number and replace the perfinfo section of the problem file with that of the good file.

Below are some links to data required if you see the issues above. Simply insert the contents of this file in between the perfinfo sections. <perf-info> PutTheDataHere </perf-info>

[7.0.3](#)

[7.2.5.1](#)

[7.2.6.1](#)

[7.3.1.1](#)

Another way to fix this is to copy one of the text files from below, place a <perf-info> block at the front and a </perf-info> block at the end. Next open a command prompt window and then type the following: -

```
type <perfInfoFile> > temp.txt
type <uncompressedCMSTATS> >> temp.txt
ren temp.txt <somethingMoreUseful>
```