

Intel® PMWatch

User Guide

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Introduction

Intel® PMWatch (PersistentMemoryWatch) is a tool that monitors and reports the behavior of the Intel® Optane™ DC persistent memory.

Tool Usage

Collecting Data

Overview

```
pmwatch "<sampling interval>" "<number of samples>" [-hi] -f outputfile.csv
```

Example: "pmwatch 1 100 [-hi]" reads the counters every 1 second (provides the delta) 100 times. If -hi is given, it will collect health information.

The default metrics provided are memory performance metrics.

Options

This section explains options provided by the tool.

DCPMM DIMM Topology

Use the following command to obtain the version information and DCPMM DIMM memory topology.

```
pmwatch -a
```

Indefinite Run

Default Duration

Use the following command to run indefinitely with a default collection time of 1 second.

```
pmwatch 1
```

Use the following command to stop the collection: `pmwatch-stop`

User Defined Duration

```
pmwatch "<sampling interval>" 0
```

Example: "pmwatch 1 0" reads the counters every 1 second indefinitely

Lifetime Count Snapshot

Use the “-l” option to view the lifetime count snapshot of memory performance metrics.

```
pmwatch -l
```

Additional Options

Health Information

Use the option “-hi/--health-info” to collect health information instead of memory performance. The explanation of the health information are available [here](#).

Output Format

There are 2 output formats available with PMWatch, the default format and metric grouping format.

In default format, the grouping is based on DIMMs. The metrics associated with a DIMM are grouped together.

In metric grouping format, the metrics are grouped based on the hardware topology.

Use the option “-g/--group-metrics-format” to obtain the output in metric grouping format.

-g option is available is only available with memory performance metrics.

Output File

Use the option “-f <output.csv>” to save the output to the file <output.csv>.

Use the option “-F <output.csv>” to append the output to the file <output.csv>.

Delimiter

The default delimiter in the output data is “;”.

Use the option “-td/--tab-delimited” to use tab as delimiter.

Explanation of metrics

Memory Performance

bytes_read (derived) :

bytes_written (derived):

Number of bytes transacted by the read and write operations.

Note: The total number of bytes transacted in any sample is computed as bytes_read (derived) + 2 * bytes_written (derived).

Formula:

bytes_read : (read_64B_ops_received - write_64B_ops_received) * 64

bytes_written: write_64B_ops_received * 64

read_hit_ratio (derived) : measures the efficiency of the buffer in the read path. Range of 0.0 - 0.75.

write_hit_ratio (derived): measures the efficiency of the buffer in the write path. Range of 0.0 - 1.0.

0.75 : indicates 100% sequential read or write traffic

> 0.75 : indicates writing to 64B addresses that are still in the WDB (never had to go to media)

1 or ~1 : likely writing to a specific address or small range of addresses (fitting in write buffer) for long periods of time.

Formula:

read_hit_ratio : (cpu_read_ops - media_read_ops) / cpu_read_ops

write_hit_ratio: (cpu_write_ops - media_write_ops) / cpu_write_ops

media_read_ops (derived) :

media_write_ops (derived):

Number of read and write operations performed to the physical media. Each operation transacts a 256 bytes operation.

Formula:

media_read_ops : (read_64B_ops_received - write_64B_ops_received) / 4

media_write_ops: write_64B_ops_received / 4

read_64B_ops_received :

write_64B_ops_received:

Number of read and write operations performed to the physical media. Each operation transacts a 64 bytes operation. These operations includes commands transacted for maintenance as well as the commands transacted by the CPU.

cpu_read_ops :

cpu_write_ops:

Number of read and write operations received from the CPU (memory controller), for the Memory Mode and App Direct Mode partitions.

Health Information

health_status:

Overall health summary.

Value	Health Status
0	Normal
1	Non-critical
2	Critical
3	Fatal

lifespan_used:

The module's used life as a percentage value of factory expected like span.

lifespan_remaining:

The module's remaining life as a percentage value of factory expected like span.

power_on_time:

The lifetime the DIMM has been powered on in seconds.

uptime:

The current uptime of the DIMM for the current power cycle in seconds.

last_shutdown_time:

The time the system was last shutdown. The time is represented in epoch (seconds).

media_temp :

The media's current temperature in degrees Celsius.

controller_temp :

The controller's current temperature in degrees Celsius.

max_media_temp :

The media's the highest temperature reported in degrees Celsius.

max_controller_temp :

The controller's highest temperature reported in degrees Celsius.