DELL EMC

White Paper

Telemetry Storage Report

Abstract

This white paper explains how to use the Telemetry Storage reports to access information on PowerEdge server drives and cards.

February 2020

Revisions

Date	Description
February 2020	Initial release

Acknowledgements

This paper was produced by the following:

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Executive summary

The latest firmware for iDRAC9 adds the Telemetry feature, a one-to-many solution for collecting and streaming live system data from one or more PowerEdge servers to a centralized, remote server that provides monitoring, analysis, and alerting services. The feature also supports on-demand data collection of the data. This white paper discusses the three telemetry storage reports and the telemetry data they provide that are available from SSD and NVMe (Non-volatile Memory express) SMART drives, which could be used to assess the health and state of the drives on the server.

1 Introduction

Three storage reports produce storage metrics that can be pulled on demand through Redfish APIs, or pushed through http subscription, remote syslog, or server-side event (SSE) -based methods. For information about best practices, troubleshooting tips, and how to set up telemetry report streams, see the Dell EMC white paper Telemetry Getting Started.

1.1 Prerequisites

- iDRAC Datacenter license installed.
- iDRAC version 4.00.00.00 or later

2 Telemetry storage metric reports

2.1 Overview

These three telemetry storage metric reports are supported in the iDRAC 4.00 release:

Table 1 Telemetry storage reports

Report	Metrics	Description
StorageDiskSMARTData	CRCErrorCount,CommandTimeout,CurrentPendingSectorCount,DriveTemperature,ECCERate,EraseFailCount,ExceptionModeStatus,MediaWriteCount,PercentDriveLifeRemaining,PowerCycleCount,PowerOnHours,ProgramFailCount,ReadErrorRate,ReallocatedBlockCount,UncorrectableErrorCount,UncorrectableLBACount,UnusedReservedBlockCount,UsedReservedBlockCount,VolatileMemoryBackupSourceFailures	SSD SMART information
NVMeSMARTData	AvailableSpare,AvailableSpareThreshold,CompositeTemparature,ControllerBusyTimeLower,ControllerBusyTimeUpper,CriticalWarning,DataUnitsReadLower,DataUnitsReadUpper,DataUnitsWrittenLower,DataUnitsWrittenUpper,HostReadCommandsLower,HostReadCommandsUpper,HostWriteCommandsLower,HostWriteCommandsUpper,MediaDataIntegrityErrorsLower,MediaDataIntegrityErrorsUpper,NumOfErrorInfoLogEntriesLower,NumOfErrorInfoLogEntriesUpper,PercentageUsed,PowerCyclesLower,PowerCyclesUpper,PowerOnHoursLower,PowerOnHoursUpper,UnsafeShutdownsLower,UnsafeShutdownsUpper	PCIeSSD/NVMe device SMART information
StorageSensor	TemperatureReading	Temperature information for server storage internal devices

2.1.1 StorageDiskSMARTData report

Table 2 StorageDiskSMARTData report details

Metric	Description
CRCErrorCount	CRC error count
CommandTimeout	The number of aborted operations due to disk timeout
CurrentPendingSectorCount	Current pending sector count
DriveTemperature	Drive temperature in Celsius
ECCERate	Uncorrected read errors reported
EraseFailCount	Erase fail count
ExceptionModeStatus	Exception mode status
MediaWriteCount	Media (SSD) write count
PercentDriveLifeRemaining	Drive Life Remaining in percentage
PowerCycleCount	Count of full hard disk power on/off cycles.
PowerOnHours	Raw value of this attribute shows total count of hours (or minutes, or seconds, depending on manufacturer) in power-on state

Metric	Description
ProgramFailCount	Program fail count since drive was deployed
ReadErrorRate	Read error rate
ReallocatedBlockCount	Reallocated block count
UncorrectableErrorCount	Uncorrectable error count
UncorrectableLBACount	Uncorrectable Logical block addressing count
UnusedReservedBlockCount	Unused reserved block count
UsedReservedBlockCount	Used reserved block count
VolatileMemoryBackupSourceFailures	Volatile memory backup source failures

2.1.2 NVMeSMARTData report

Table 3 NVMeSMARTData report details

Metric	Description
AvailableSpare	Specifies the remaining spare capacity available as a normalized percentage (0 to 100%).
AvailableSpareThreshold	The available spare value below which an asynchronous event completion may occur. The value is indicated as a normalized percentage (0 to 100%).
CompositeTemperature	Indicates the current composite temperature in Kelvin of the controller and namespaces associated with that controller.
ControllerBusyTimeLower	Contains the lower boundary of the amount of time in minutes the controller is busy with I/O command.
ControllerBusyTimeUpper	Contains the upper boundary of the amount of time in minutes the controller is busy with I/O commands.
CriticalWarning	Indicates critical warnings about the controller state.
DataUnitsReadLower	Specifies the lower boundary of the count of 512-byte data units the host has read from the controller. This value is reported in thousands and is rounded up.
DataUnitsReadUpper	Specifies the upper boundary of the count of 512-byte data units the host has read from the controller. This value is reported in thousands and is rounded up.
DataUnitsWrittenLower	Specifies the lower boundary of the count of 512-byte data units the host has written to the controller. This value is reported in thousands and is rounded up.
DataUnitsWrittenUpper	Specifies the upper boundary of the count of 512-byte data units the host has written to the controller. This value is reported in thousands and is rounded up.
HostReadCommandsLower	Specifies the lower boundary of the number of read commands completed by the controller.
HostReadCommandsUpper	Specifies the lower part of the number of read commands completed by the controller.
HostWriteCommandsLower	Specifies the lower boundary of the number of write commands completed by the controller.
HostWriteCommandsUpper	Specifies the upper boundary of the number of write commands completed by the controller.
MediaDataIntegrityErrorsLower	Contains the lower boundary of the count of detected unrecovered data integrity errors. Includes errors such as uncorrectable ECC, CRC checksum failure, and LBA tag mismatch.
MediaDataIntegrityErrorsUpper	Contains the upper boundary of the count of detected unrecovered data integrity errors. Includes errors such as uncorrectable ECC, CRC checksum failure, and LBA tag mismatch.

Metric	Description
NumOfErrorInfoLogEntriesLower	Contains the lower boundary of the count of error information log entries over the life of the controller.
NumOfErrorInfoLogEntriesUpper	Contains the upper boundary of the count of error information log entries over the life of the controller.
PercentageUsed	Specifies a vendor-specific estimate of the percentage of NVMe (Non-volatile Memory) subsystem life used based on the actual usage and the manufacturer's prediction of NVMe life.
PowerCyclesLower	Specifies the lower boundary of the number of power cycles.
PowerCyclesUpper	Specifies the upper boundary of the number of power cycles.
PowerOnHoursLower	Specifies the lower boundary of the number of hours powered on. Hours may not include time that the controller was powered and in a non-operational power state.
PowerOnHoursUpper	Specifies the upper boundary of the number of hours powered on. Hours may not include time that the controller was powered and in a non-operational power state.
UnsafeShutdownsLower	Contains the lower boundary of the number of unsafe shutdowns. This count is incremented when a shutdown notification (CC.SHN) is not received prior to loss of power.
UnsafeShutdownsUpper	Contains the upper boundary of the number of unsafe shutdowns. This count is incremented when a shutdown notification (CC.SHN) is not received prior to loss of power.

2.1.3 StorageSensor report

Table 4 StorageSensor report details

Metric	Detail
TemperatureReading	Temperature information for server storage internal devices

2.2 Supported devices for storage metric reports

Table 5 Devices supported

Telemetry report	Devices supported
StorageDiskSMARTData	SAS/SATA SSD drives behind PERC storage controller
NVMeSMARTData	PCIeSSD/NVMe devices (drives and HHHL cards) not behind a SWRAID controller
StorageSensor	PCIeSSD/NVMe devices (drives and HHHL cards) SAS/SATA HDD/SSD drives behind PERC, BOSS M.2 drives, and SATA HDD/SSD behind a SWRAID controller

2.3 Special cases of hotplug storage devices

When you hot swap the drives, all three storage reports will reflect the change on the fly within the reportInterval.

2.4 Workflow examples

Configure the storage reports using either the racadm, Redfish APIs, or SCP interfaces.

For example:

```
racadm>>set idrac.telemetry.EnableTelemetry  Enabled
[Key=idrac.Embedded.1#Telemetry.1]
```

```
Object value modified successfully

racadm>>set idrac.TelemetryNVMeSMARTData.1.EnableTelemetry Enabled
[Key=idrac.Embedded.1#TelemetryNVMeSMARTData.1]
Object value modified successfully
```

After applying the above configuration, you can pull—or stream—the NVMeSMARTData through http subscription, remote syslog, or server-side events (SSE) -based methods. See the Dell EMC white paper, *Telemetry Getting Started* for information on how to configure the telemetry feature.

Similarly, other storage reports can be configured and streamed to help you assess the health and state of the drives on your server.

The example screenshots that follow are from servers with multiple SSD and SMART drives. The storage report metrics visualized below show the drive temperatures, drive states, drive lifetime, and more.

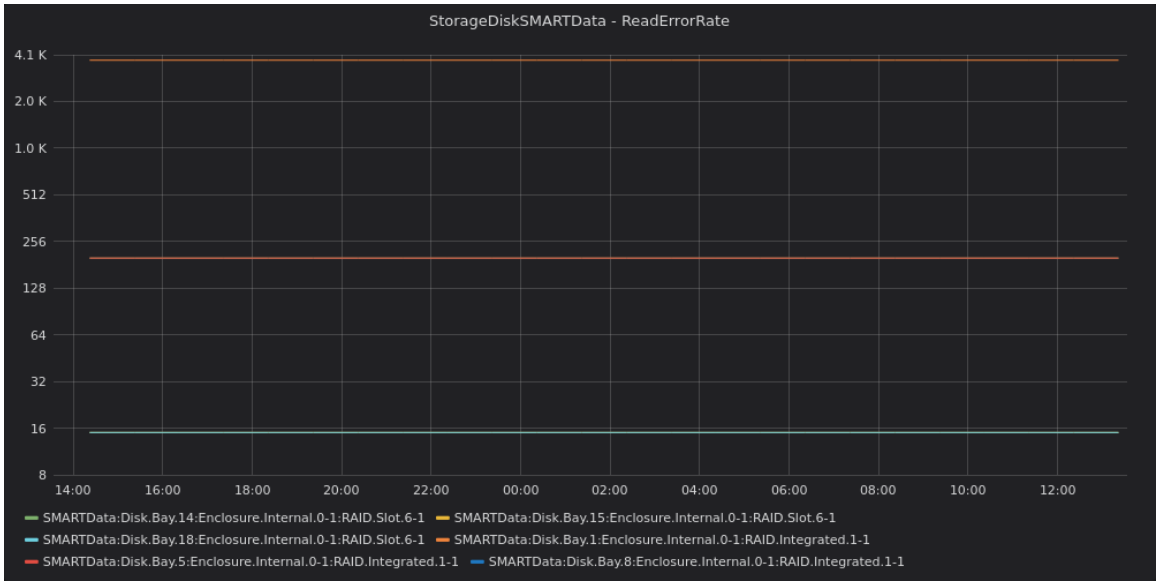

Figure 1 StorageDiskSMARTData - ReadErrorRate

Figure 2 StorageSensor - TemperatureReading

Figure 3 StorageDiskSMARTData - PercentageDriveLifeRemaining

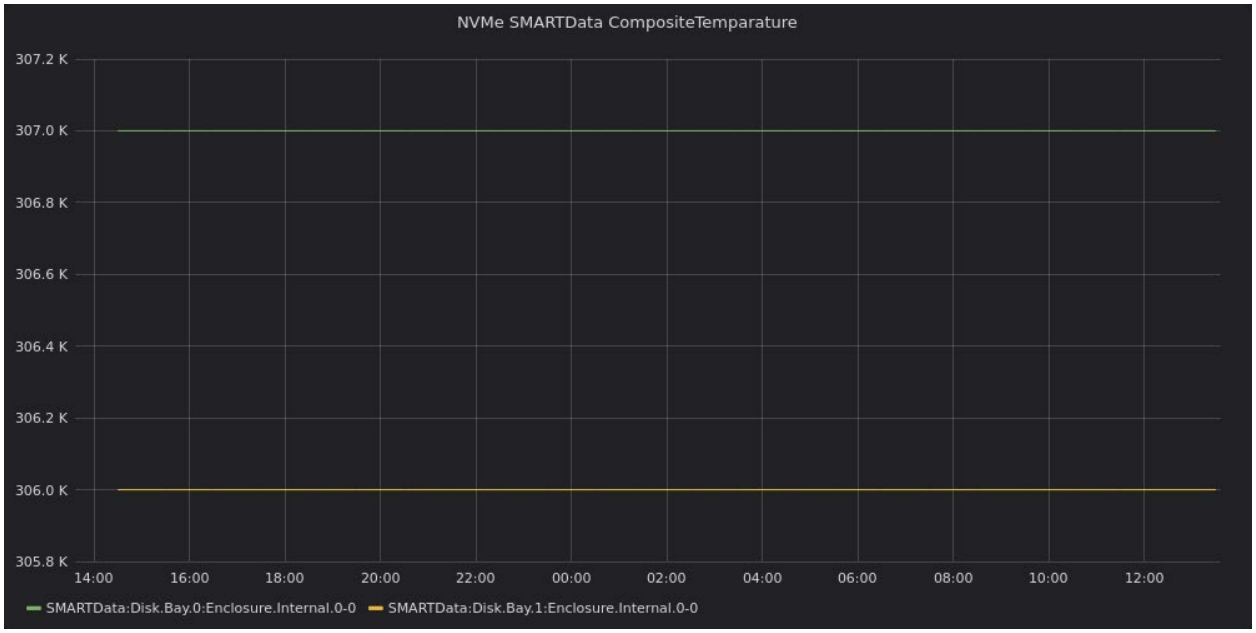

Figure 4 NVMe SMARTData - CompositeTemperature

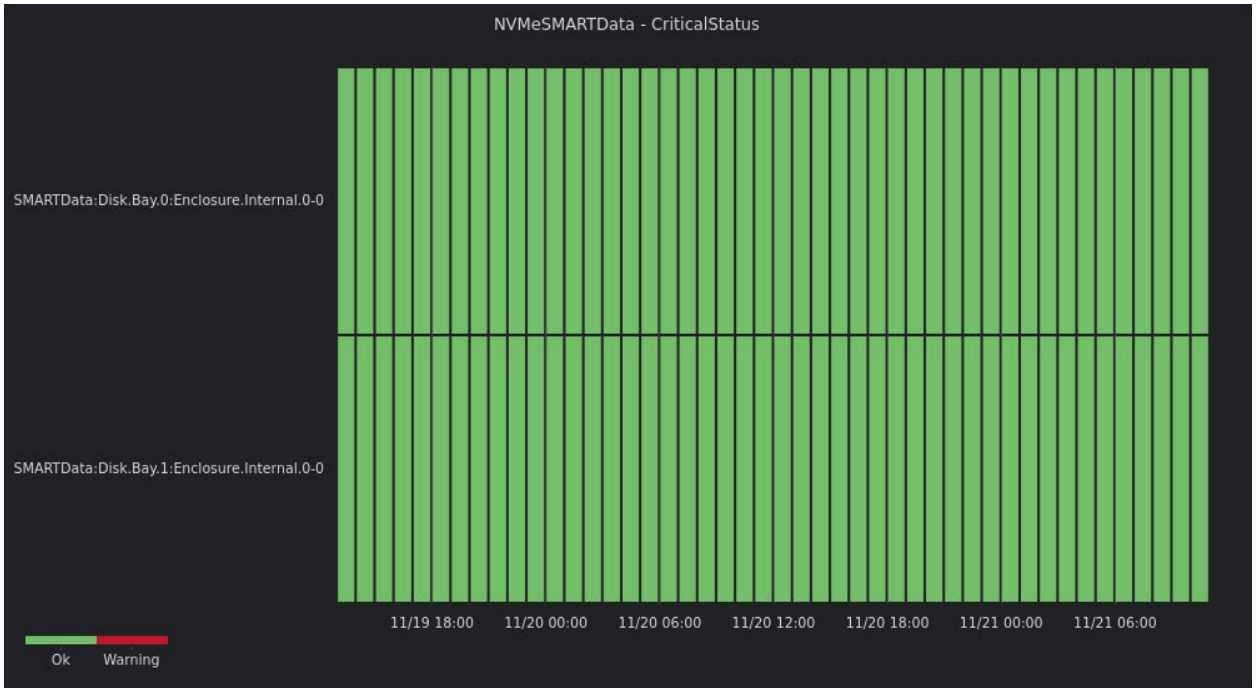

Figure 5 NVMe SMARTData - CriticalStatus

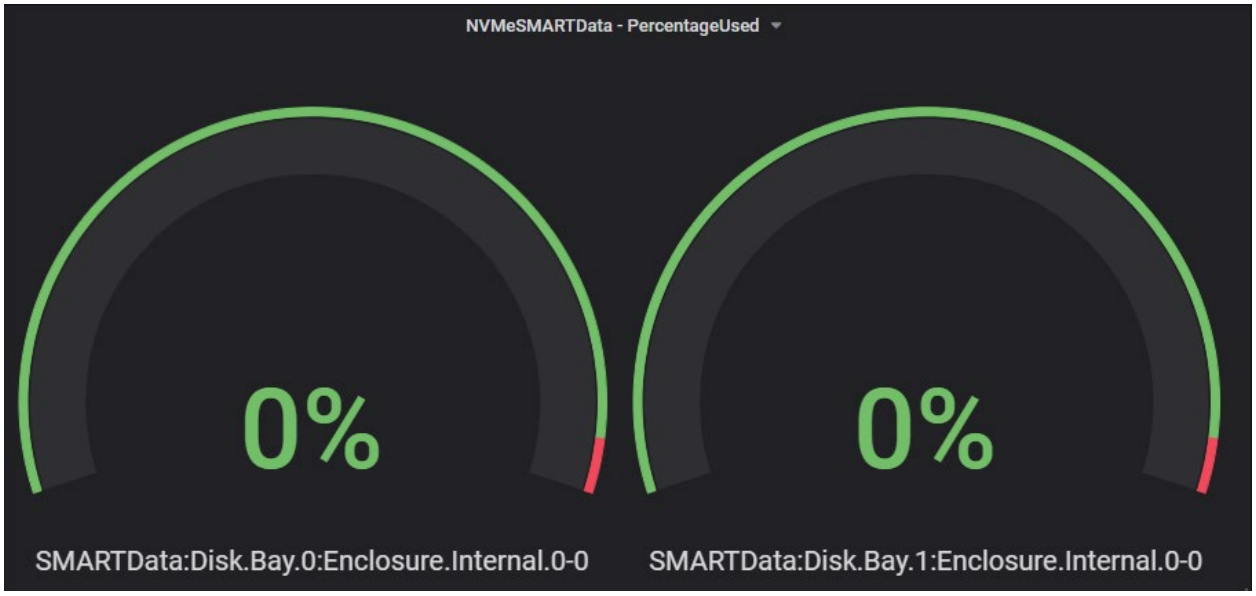

Figure 6 NVMe SMARTData - PercentageUsed

Figure 7 NVMe SMARTData – PowerOnHours

A Technical support and resources

Dell.com/support is focused on meeting customer needs with proven services and support.

Storage technical documents and videos provide expertise that helps to ensure customer success on Dell EMC storage platforms.

A.1 Related resources

https://www.dell.com/support/article/sln311300