Chassis Health Monitoring using WSMAN

Whitepaper for reading the health of chassis and its vital components using WSMAN

Dell Engineering
October 2016

A Dell Technical White Paper
Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
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<tbody>
<tr>
<td>October 2016</td>
<td>Initial release</td>
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</tbody>
</table>

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# Table of contents

Revisions .......................................................................................................................... 2

1 Glossary .......................................................................................................................... 4

2 Executive summary ......................................................................................................... 5

3 Introduction ...................................................................................................................... 6

4 Chassis Health Monitoring .............................................................................................. 7

  Table – PrimaryStatus/RollupStatus Mapping ................................................................. 8

  4.1 Chassis Health ............................................................................................................ 8

  4.1.1 Instance & Rollup health .......................................................................................... 8

  4.2 Blade Health ................................................................................................................ 9

  4.2.1 Instance health ......................................................................................................... 9

  4.2.2 Rollup health ........................................................................................................... 9

  4.3 IOM Health .................................................................................................................. 10

  4.3.1 Instance health ....................................................................................................... 10

  4.3.2 Rollup health .......................................................................................................... 11

  4.4 Fan Health .................................................................................................................. 11

  4.4.1 Instance health ....................................................................................................... 11

  4.4.2 Rollup health .......................................................................................................... 12

  4.5 PSU Health .................................................................................................................. 13

  4.5.1 Instance health ....................................................................................................... 13

  4.5.2 Rollup health .......................................................................................................... 13

  4.6 KVM Health ................................................................................................................ 14

  4.6.1 Instance health ....................................................................................................... 14

  4.6.2 Rollup health .......................................................................................................... 15

  4.7 Chassis Temperature Health ...................................................................................... 15

  4.7.1 Instance health ....................................................................................................... 15

  4.7.2 Rollup health .......................................................................................................... 16

  4.8 Chassis Storage Health (VRTX Only) ...................................................................... 16

  4.8.1 Rollup health .......................................................................................................... 17

  4.9 Storage Sled Health (FX2 only) ................................................................------------- 17

  4.9.1 Instance health ....................................................................................................... 17

  4.9.2 Rollup health .......................................................................................................... 18
# Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Module/Component</td>
<td>Fan, PSU, Blade</td>
</tr>
<tr>
<td>Rollup Status</td>
<td>Combined health status of a component</td>
</tr>
<tr>
<td>Primary status</td>
<td>Health status of an instance of a component</td>
</tr>
<tr>
<td>FX2</td>
<td>2U chassis</td>
</tr>
<tr>
<td>M1000e</td>
<td>8U chassis</td>
</tr>
<tr>
<td>VRTX</td>
<td>5U chassis</td>
</tr>
</tbody>
</table>
2 Executive summary

This white paper describes the health monitoring of chassis and its components using Windows Remote Management (WinRM) tool. The health monitoring features are available through a secure and standards-based Web Services Management (WSMan) interface of the Chassis Management Controller (CMC) on Dell PowerEdge M1000e, VRTX, and FX2 chassis. This white paper is for console application developers who have some WSMAN knowledge to understand terminologies described in this white paper.
Introduction

The Dell™ Chassis Management Controller (CMC) provides chassis monitoring, control, and remote access features for a chassis and its components. CMC is designed to provide secure, simple, scriptable, and standards-based remote management capability through Web Services for Management (WSMAN) for Dell PowerEdge™ M1000e, VRTX, and FX2 chassis systems.

The minimum firmware versions required to use these features on the CMC are 5.2 for M1000e, 2.2 for VRTX, and 1.4 for FX2 chassis.
Chassis Health Monitoring

This white paper describes the newly implemented health monitoring feature in CMC WSMAN software solution. This feature covers the health of the chassis and the vital chassis components like Blade, IOM, fan, PSU, KVM, and temperature.

Health monitoring is done at two levels, PrimaryStatus and RollupStatus. PrimaryStatus represents the health of single instance of an individual component while RollupStatus represents the combined health of all the instances of an individual component.

For example, consider the fan subsystem in the chassis. A chassis has multiple fans and the status of each can be enumerated through Dell_Fan class using WSMAN APIs. The PrimaryStatus field of the Dell_Fan class provides the individual health status of the fan. So, for N fan instances, we have N different primary statuses. If all Fans are working properly, the primary status of each fan is displayed as **OK**. If one instance of the fan is broken then, for that fan the Primary status is displayed as **Degraded (Warning)**, **Error (Critical)**, or **Unknown (Not able to find status)**, depending on the issue. However, for an overall picture of the fans, more like a snapshot, enumerate the DCIM_ModularChassisView class, which gives the RollupStatus of each of the chassis system component. In DCIM_ModularChassisView, the FanRollupStatus field provides the cumulative status of the fan subsystem.
Please find below the table for possible values of PrimaryStatus and RollupStatus and their mappings.

### Table – PrimaryStatus/RollupStatus Mapping
Below table specifies the possible values of the PrimaryStatus/RollupStatus.

<table>
<thead>
<tr>
<th>Value</th>
<th>ValueMap</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Unknown</td>
<td>Implementation is unable to return the value of this property.</td>
</tr>
<tr>
<td>1</td>
<td>OK</td>
<td>Indicates the element is functioning normally.</td>
</tr>
<tr>
<td>2</td>
<td>Degraded</td>
<td>Indicates the element is functioning below normal.</td>
</tr>
<tr>
<td>3</td>
<td>Error</td>
<td>Indicates the element is in an error condition.</td>
</tr>
</tbody>
</table>

### 4.1 Chassis Health
Chassis health is represented by PrimaryStatus and RollupStatus property of DCIM_ModularChassisView class. As there is single instance of chassis, PrimaryStatus & RollupStatus property show the same values. If any of the vital components of the chassis is in degraded or error state, then the chassis health indicates the same.

### 4.1.1 Instance and Rollup health
Instance and Rollup health of the chassis is represented by PrimaryStatus & RollupStatus property of the DCIM_ModularChassisView class respectively.

The WSMAN enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.

```
```

**Sample Output:**

```
DCIM_ModularChassisView
    PowerState = x
PrimaryStatus = 3
PwrInputInfrastructureAllocation = xx
RemoteHostNTPServer3
RollupStatus = 3
```
From the sample output shown above, we see that the PrimaryStatus value is ‘3’, which implies that the chassis health is in “Error” state.

For possible values of PrimaryStatus, refer to the Table above.

4.2 Blade Health

Blade instance health is represented by PrimaryStatus property of DCIM_BladeServerView class and blade rollup health is represented by BladeRollupStatus property in DCIM_ModularChassisView class.

4.2.1 Instance health

Blade instance health is represented by PrimaryStatus property of DCIM_BladeServerView class.

The WSMan enumerate command for the DCIM_BladeServerView class and sample output of an instance is given below.


Sample Output:
DCIM_BladeServerView

PowerState = x
PrimaryStatus = 1
RegDNSNameEnabled = false

From the sample output above, we see that the PrimaryStatus value is ‘1’, which implies that the blade health is in “OK” state.

For possible values of PrimaryStatus, refer to the Table above.

4.2.2 Rollup health

Rollup health represents the overall health of the component. Rollup health is represented by BladeRollupStatus property of the DCIM_ModularChassisView class.
The WSMan enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.


Sample Output:
DCIM_ModularChassisView
   ACPowerRecoveryDisable = 0
   AssetTag = 00000
   **BladeRollupStatus = 3**
   ...

From the sample output shown above, we see that the BladeRollupStatus value is ‘3’, which implies that the overall blade component health is in “Error” state.

For possible values of RollupStatus, refer to the Table above.

4.3 IOM Health

IOM instance health is represented by PrimaryStatus property of Dell_IOMPackage class and IOM rollup health is represented by IOMRollupStatus property in DCIM_ModularChassisView class.

4.3.1 Instance health

Instance health of IOM is represented by PrimaryStatus property of Dell_IOMPackage class.

The WSMan enumerate command for the Dell_IOMPackage class and sample output of an instance is given below.


Sample Output:
Dell_IOMPackage
   ...
   **PartNumber = xxx**
   **PrimaryStatus = 1**
   Role = xx
   ...
   ...

From the sample output shown above, we see that the PrimaryStatus value is '1', which implies that the IOM health is in "OK" state.

For possible values of PrimaryStatus, refer to the table above.

### 4.3.2 Rollup health

Rollup health represents the overall health of the component. Rollup health of IOM is represented by IOMRollupStatus property on DCIM_ModularChassisView class.

The WSMAN enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.

```bash
```

Sample Output:

```
DCIM_ModularChassisView

HostName = xxxx
IOMRollupStatus = 1
IPv4Address = xx.xx.xx.xx
```

From the sample output shown above, we see that the IOMRollupStatus value is '1', which implies that the IOM component health is in "OK" state.

For possible values of RollupStatus, refer to the table above.

### 4.4 Fan Health

Fan instance health is represented by PrimaryStatus property of Dell_Fan class and fan rollup health is represented by FanRollupStatus property in DCIM_ModularChassisView class.

#### 4.4.1 Instance health

Instance health of Fan is represented by PrimaryStatus property of Dell_Fan class.

The WSMAN enumerate command for the Dell_Fan class and sample output of an instance is given below.

```bash
```
Sample Output:
Dell_Fan

PWM = xx
PrimaryStatus = 1
RPM = xxxx

From the sample output shown above, we see that the PrimaryStatus value is ‘1’, which implies that the fan health is in “OK” state.

For possible values of PrimaryStatus, refer to the table above.

4.4.2 Rollup health

Rollup health represents the overall health of the component. Rollup health of Fan is represented by FanRollupStatus property of DCIM_ModularChassisView class.

The WSMan enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.


Sample Output:
DCIM_ModularChassisView

FQDD = System.Chassis.x
FanRollupStatus = 1
FlexFabricState = true, true, true, true

From the sample output shown above, we see that the FanRollupStatus value is ‘1’, which implies that the Fan component health is in “OK” state.

For possible values of RollupStatus, refer to the table above.
4.5 PSU Health

PSU instance health is represented by PrimaryStatus property of Dell_PowerSupply class and PSU rollup health is represented by PSRollupStatus property in DCIM_ModularChassisView class.

4.5.1 Instance health

Instance health of PSU is represented by PrimaryStatus property of Dell_PowerSupply class.

The wsman enumerate command for the Dell_PowerSupply class and sample output of an instance is given below.

```
```

**Sample Output:**

```
Dell_PowerSupply
  
  OperationalStatus = x
  PrimaryStatus = 1
    RequestedState = xx
```

From the sample output shown above, we see that the PrimaryStatus value is ‘1’, which implies that the PSU health is in “OK” state.

For possible values of PrimaryStatus, refer to the table above.

4.5.2 Rollup health

Rollup health represents the overall health of the component. Rollup health of PSU is represented by PSRollupStatus property of DCIM_ModularChassisView class.

The WSMAN enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.

```
```

**Sample Output:**

```
DCIM_ModularChassisView
  
```
From the sample output shown above, we see that the PSRollupStatus value is '1', which implies that the PU component health is in "OK" state.

For possible values of RollupStatus, refer to the table above.

4.6 KVM Health

KVM instance health is represented by PrimaryStatus property of Dell_KVM class and KVM rollup health is represented by KVMRollupStatus property in DCIM_ModularChassisView class.

4.6.1 Instance health

Instance health of KVM is represented by PrimaryStatus property of Dell_KVM class.

The WSMAn enumerate command for the Dell_KVM class and sample output of an instance is given below.


Sample Output:
Dell_KVM
  .
  .
  .
  OtherIdentifyingInfo = pkgxxx
  PrimaryStatus = 1
  RequestedState = xx
  .
  .
  .

From the sample output shown above, we see that the PrimaryStatus value is '1', which implies that the KVM health is in "OK" state.

For possible values of PrimaryStatus, refer to the table above.
### 4.6.2 Rollup health
Rollup health represents the overall health of the component. Rollup health of KVM is represented by KVMRollupStatus property of DCIM_ModularChassisView class.

The WSMan enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.

```bash
C:\>winrm e http://schemas.dmtf.org/wbem/wscim/1/cimschema/2/<USERNAME>/dell/cmc/DCIM_ModularChassisView -u:<USERNAME> -p:<PASSWORD> -r:https://<IDRAC_IP_ADDRESS>/wsman -SkipCNcheck -SkipCAdcCheck -SkipCertValidation -SkipCAdcCheck -encoding:utf-8 -a:basic
```

**Sample Output**:

```plaintext
DCIM_ModularChassisView
.
.
.
InstanceID = dcim:System.Chassis.x
KVMRollupStatus = 1
Location = [UNDEFINED]
.
.
From the sample output shown above, we see that the KVMRollupStatus value is ‘1’, which implies that the KVM module health is in “OK” state.

For possible values of RollupStatus, refer to the Table above.
```

### 4.7 Chassis Temperature Health
Chassis Temperature instance health is represented by PrimaryStatus property of Dell_ChassisNumSensor class and chassis temperature rollup health is represented by ChassisTempRollupStatus property in DCIM_ModularChassisView class.

### 4.7.1 Instance health
Instance health of chassis temperature is represented by PrimaryStatus property of Dell_ChassisNumSensor class.

The WSMan enumerate command for the Dell_ChassisNumSensor class and sample output of an instance is given below.

```bash
```

**Sample Output**:
Dell_ChassisNumSensor

PossibleStates = Unknown
PrimaryStatus = 1
RateUnits = x

From the sample output shown above, we see that the PrimaryStatus value is ‘1’, which implies that the chassis temperature health is in “OK” state.

For possible values of PrimaryStatus, refer to the table above.

4.7.2 Rollup health

Rollup health represents the overall health of the component. Rollup health of chassis temperature is represented by ChassisTempRollupStatus property of DCIM_ModularChassisView class.

The WSMAN enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.


Sample Output:
DCIM_ModularChassisView

ChassisExternalPowerCap = xxxx
ChassisTempRollupStatus = 1
DNSCMCName = xxxx

From the sample output shown above, we see that the ChassisTempRollupStatus value is ‘1’, which implies that the chassis temperature component health is in “OK” state.

For possible values of RollupStatus, refer to the table above.

4.8 Chassis Storage Health (VRTX Only)

Chassis Storage rollup health is represented by ChassisStorageRollupStatus property in DCIM_ModularChassisView class.

There is no instance health of chassis storage as chassis storage consists of many components like controllers, enclosures, physical disks, virtual disks etc.
4.8.1 Rollup health

Rollup health represents the overall health of the module. Rollup health is represented by ChassisStorageRollupStatus property of DCIM_ModularChassisView class.

The WSMan enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.

```
```

**Sample Output:**

```
DCIM_ModularChassisView
  .
  .
  ChassisExternalPowerCap = xxx
  ChassisStorageRollupStatus = 1
  ChassisTempRollupStatus = 1
  .
  .
```

From the sample output shown above, we see that the ChassisStorageRollupStatus value is ‘1’, which implies that the chassis storage component health is in “OK” state.

For possible values of RollupStatus, refer to the table above.

4.9 Storage Sled Health (FX2 only)

Storage sled instance health is represented by PrimaryStatus property of DCIM_StorageSledView class and storage sled rollup health is represented by StorageSledRollupStatus property in DCIM_ModularChassisView class.

4.9.1 Instance health

Instance health of storage sled is represented by PrimaryStatus property of DCIM_StorageSledView class.

The WSMan enumerate command for the DCIM_StorageSledView class and sample output of an instance is given below.

```
```

**Sample Output:**

```
DCIM_StorageSledView
```
From the sample output shown above, we see that the PrimaryStatus value is ‘1’, which implies that the chassis temperature health is in “OK” state.

For possible values of PrimaryStatus, refer to the table above.

4.9.2 Rollup health

Rollup health represents the overall health of the component. Rollup health is represented by StorageSledRollupStatus property of DCIM_ModularChassisView class.

The WSMAn enumerate command for the DCIM_ModularChassisView class and sample output of an instance is given below.


Sample Output:
DCIM_ModularChassisView
    ServiceTag = xxxx
    StorageSledRollupStatus = 1
    SystemID = xxx

From the sample output shown above, we see that the StorageSledRollupStatus value is ‘1’, which implies that the storage sled component health is in “OK” state.

For possible values of RollupStatus, refer to the table above.