Web Service Eventing Support for Hardware Inventory and Monitoring

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Executive Summary

This technical white paper discusses the implementation of Web Services Eventing (WS-Eventing) for hardware inventory change events and hardware monitoring notification events. The white paper aims to describe the indication management infrastructure for managed hardware in a server.

1 Introduction

WS-MAN is a standard based protocol defined by DMTF used by systems management consoles. WS-MAN provides methods for inventoring, monitoring and controlling system devices. WS-MAN specification also defines a protocol for incident management. Web Services-Eventing (WS-Eventing) defines a protocol for a console (subscriber) to register interest (subscription) with a server web service (event source) in receiving the messages containing the server’s events (notifications or event messages). Clients or consoles interested in receiving the WS-Eventing from a WS-Man implementation can subscribe for the hardware inventory changes (additions and removals) and hardware monitoring (power change, OS boot) notifications. WS-Eventing is a powerful tool in managing the system asynchronously, wherein a script developer can take actions on certain subscribed incidents. For example, a workflow can be written to monitor a sensor and if the sensor reading goes over a threshold value, a server restart must be performed. This can be performed by polling the sensor or by subscribing to the events and waiting for the event to occur.
This white paper is an extension to the existing WS-Eventing behavior for LifeCycle JobAlert Indications and covers the hardware notification part of eventing mechanism. WS-Eventing for LifeCycleJobAlert Indications white paper has to be referred for the following: For information on

- Prerequisites to Enable WS-Eventing on iDRAC
- Create Event Subscriptions
  - Event Sink
  - Expiry time
  - Subscription Identifier
- Renew Subscription
- Deleting Subscription

see

http://en.community.dell.com/techcenter/extras/m/white_papers/20436967/download.aspx
Enabling alerts

To globally enable or disable the alerts, clients can use the `DCIM_iDRACCardService.ApplyAttributes()` or `DCIM_iDRACCardService.SetAttribute()` method from the DCIM iDRAC Card Profile. You can send a request for the following form to globally enable the Alerts.

Figure 1 SOAP Request for ApplyAttributes

```xml
<envelope xmlns:m='http://schemas.dell.com/wbem/wscim/1/cim-schema/2/DCIM_iDRACCardService' xmlns:s='http://www.w3.org/2003/05/soap-envelope'
  <header>
    <wsa:To s:mustUnderstand='true'>https://10.94.225.152:443/wsman</wsa:To>
    <wsa:MessageID s:mustUnderstand='true'>urn:uuid:8bbed670-1c62-11e4-848b-e4b30b94049</wsa:MessageID>
    <wsa:OperationTimeout>PT300.0S</wsa:OperationTimeout>
  </header>
  <body>
    <s:Envelope>
      <s:Body>
        <s:ApplyAttributes_INPUT>
          <s:AttributeName>IPMIelan.1#AlertEnable</s:AttributeName>
          <s:AttributeValue>Enabled</s:AttributeValue>
          <s:Target>192.168.1.10</s:Target>
        </s:ApplyAttributes_INPUT>
      </s:Body>
    </s:Envelope>
  </body>
</envelope>
```
Users can also log in to iDRAC Web interface and go to the **Alerts** page to enable the alerts.

**Figure 2 iDRAC Web GUI—Alerts Page**
Enabling WS–Eventing Alerts on iDRAC

You can enable the WS–Eventing notification using the following:

DCIM_EFConfigurationService.SetEventFilterByInstanceIDs() or
DCIM_EFConfigurationService.SetEventFilterByCategory() method from the DCIM Event Filter profile [0]. You can send a request of the following form to enable the WS–Eventing notification.

Figure 3 WS–MAN Request to Enable WS–Eventing Alerts

```xml
<soap:Envelope xmlns:soap="http://schemas.xmlsoap.org/soap/envelope/"
               xmlns:wsm1="http://schemas.dmtf.org/wbem/wsman/1/wsmans.xsd">
  <soap:Header>
    <wsm:Action mustUnderstand="true">
      http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous
    </wsm:Action>
    <wsm:To mustUnderstand="true">
      https://10.94.225.157:443/wsman
    </wsm:To>
    <wsm:ResourceURI mustUnderstand="true">
    <wsm:MessageID mustUnderstand="true">
      urn:uuid:61c1b4b8-1630-11e4-ae57-a46b38b94049</wsm:MessageID>
    <wsm:OperationTimeout>PT300.SS</wsm:OperationTimeout>
  </soap:Header>
  <soap:Body>
    <wsm:Request>
      <wsm:SelectorSet>
        <wsm:Selector Name="_cimnamespace">root\dcim</wsm:Selector>
        <wsm:Selector Name="Name">DCIM.EFConfigurationService</wsm:Selector>
        <wsm:Selector Name="CreationClassName">DCIM_EFConfigurationService</wsm:Selector>
        <wsm:Selector Name="SystemName">systemmc</wsm:Selector>
        <wsm:Selector Name="SystemCreationClassName">DCIM_SPComputerSystem</wsm:Selector>
      </wsm:SelectorSet>
    </wsm:Request>
  </soap:Body>
</soap:Envelope>
```
Users can also log in to iDRAC Web interface and navigate to Configuration category and filter the required events.

**Figure 4 iDRAC Web GUI WS–Eventing Notification**

<table>
<thead>
<tr>
<th>Category</th>
<th>Alert</th>
<th>Severity</th>
<th>Email</th>
<th>SNMP Trap</th>
<th>IPMI Alert</th>
<th>Remote System Log</th>
<th>WS Eventing</th>
<th>OS Log</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Health</td>
<td>Processor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Processor</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Proc Absent</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Fan Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Fan Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Fan Event</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Fiber Channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
<tr>
<td>System Health</td>
<td>Fiber Channel</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Action</td>
</tr>
</tbody>
</table>
4 Hardware inventory change and hardware monitoring notification events

iDRAC generates notifications for hardware inventory change events and hardware monitoring. You can subscribe to the following:

- DCIM_AlertIndication – Hardware inventory change events and hardware monitoring notification events.

Following subscription is for receiving all events of type DCIM_AlertIndication

```xml
<wse:Subscribe>
    <wse:NotifyTo>
    </wse:NotifyTo>
  </wse:Delivery>
  <wse:Expires>PT600.000000S</wse:Expires>
  <wsman:Filter Dialect="http://schemas.dmtf.org/wbem/cql/1/dsp0202.pdf">
    SELECT * FROM DCIM_AlertIndication
  </wsman:Filter>
</wse:Subscribe>
```

The filter specified "SELECT * FROM DCIM_AlertIndication" is a query that filters the iDRAC8–generated events.
4.1.1 Subscription response at event sink

```xml
  <env:Header>
    <wsa:To>http://10.04.94.127:80/eventsink</wsa:To>
    <wsa:MessageID>uuid:0bd43366-f118-1f15-8047-384d86d9f95c</wsa:MessageID>
  </env:Header>
  <env:Body>
    <env:Fault>
      <env:Reason>
        <env:细则/>
        <env:细则/>
        <env:细则/>
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        <env:细则/>
        <env:细则/>
5 Examples commands using openwsman client and DCIM_AlertIndication output

Source for the WS–Man client can be found at http://sourceforge.net/projects/openwsman/files/wsmancli/. Users can download this source, compile, and then install it on a UNIX–based operating system to send the WS–Man commands. The following are examples for sending WS–Man commands related to WS–Eventing.

Enabling Alerts

```bash
http://schemas.dmtf.org/wbem/wscim/1/cimschema/2/root/dcim/DCIM_iDRACCardService?CreationClassName="DCIM_iDRACCardService",Name="DCIM:iDRACCardService",SystemCreationClassName="DCIM_ComputerSystem",SystemName="D CIM:ComputerSystem" -k Target=iDRAC.Embedded.1 -k AttributeName=IPMILan.1#AlertEnable -k AttributeValue=Enabled -V -v -R -o -m 256 -c dummy
```

Enabling WS–Eventing Alerts

```bash
wsman invoke -a SetEventFilterByInstanceIDs -h [idrac-ip] -P 443 -u [username] -p [password] -N root/dcim http://schemas.dmtf.org/wbem/wscim/1/cimschema/2/root/dcim/DCIM_EFConfigurationService?SystemCreationClassName="DCIM_SPComputerSystem",CreationClassName="DCIM_EFConfigurationService",SystemName="systemmc",Name="DCIM:EFConfigurationService" -k InstanceID=iDRAC.Embedded.1#RACEvtFilterCfgRoot#JCP_5_3 -k RequestedNotification=6 -k RequestedAction=0 -V -v -R -o -m 256 -c dummy
```

Subscription Request

```bash
```

Renew Request

```bash
```

Unsubscribe Request

```bash
wsman unsubscribe -i uuid: 9e369e25-c894-1894-8016-335b54cb2b78 -h [idrac-ip] -P 443 -u
```
Device Addition (*DCIM_AlertIndication*), this event is sent to all subscribers on every new device addition to the server. There will be one event of this type generated for every new device added.

<table>
<thead>
<tr>
<th>DCIM_AlertIndication</th>
<th>Datatype</th>
<th>Property Name</th>
<th>Sample Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Datetime</td>
<td>IndicationTime</td>
<td></td>
<td>20010101003016.263355+000</td>
</tr>
<tr>
<td>String</td>
<td>Description</td>
<td></td>
<td>Null</td>
</tr>
<tr>
<td>uint16</td>
<td>AlertType</td>
<td></td>
<td>5 (Device Alert)</td>
</tr>
<tr>
<td>string</td>
<td>OtherAlertType</td>
<td></td>
<td>Null</td>
</tr>
<tr>
<td>uint16</td>
<td>PerceivedSeverity</td>
<td></td>
<td>2 = Informational</td>
</tr>
<tr>
<td>string</td>
<td>Category</td>
<td></td>
<td>System Health</td>
</tr>
<tr>
<td>string</td>
<td>SubCategory</td>
<td></td>
<td>FAN</td>
</tr>
<tr>
<td>uint16</td>
<td>Severity</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>string</td>
<td>SystemServiceTag</td>
<td></td>
<td>7654321</td>
</tr>
<tr>
<td>string</td>
<td>SystemFQDN</td>
<td></td>
<td>myserver.domain.com</td>
</tr>
<tr>
<td>string</td>
<td>FQDD</td>
<td></td>
<td>Fan.Embedded.1</td>
</tr>
<tr>
<td>string</td>
<td>EventID</td>
<td></td>
<td>2153</td>
</tr>
<tr>
<td>string</td>
<td>Message</td>
<td></td>
<td>Fan 1 is removed</td>
</tr>
<tr>
<td>string[]</td>
<td>MessageArguments</td>
<td></td>
<td>Null</td>
</tr>
<tr>
<td>uint16</td>
<td>AlertingElementFormat</td>
<td></td>
<td>1 (Other)</td>
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<tr>
<td>String</td>
<td>OtherAlertingElementFormat</td>
<td></td>
<td>FQDD</td>
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<tr>
<td>String</td>
<td>AlertingManagedElement</td>
<td></td>
<td>Fan.Embedded.1</td>
</tr>
<tr>
<td>String</td>
<td>OwningEntity</td>
<td></td>
<td>DCIM</td>
</tr>
<tr>
<td>Uint16</td>
<td>ProbableCause</td>
<td></td>
<td>0 (Unknown)</td>
</tr>
<tr>
<td>String</td>
<td>SystemName</td>
<td></td>
<td>myserver.domain.com</td>
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References

<table>
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<tr>
<th>Document Name</th>
<th>Document Link</th>
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<tbody>
<tr>
<td>WS-Eventing Specification</td>
<td>DSP0226, Web Services for Management 1.1.1</td>
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<tr>
<td>DMTF Indication Profile</td>
<td>DSP1054_1.0.0.pdf, Indication Profile</td>
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<td>DCIM Event Filter Profile</td>
<td><a href="http://en.community.dell.com/techcenter/extras/m/white_papers/20263517">http://en.community.dell.com/techcenter/extras/m/white_papers/20263517</a></td>
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