Remotely Running Automated Diagnostics Using WS-Man and RACADM Commands

This technical white paper describes the tasks to remotely run the diagnostics reports using RACADM and WS-Man commands, and then exporting the results to CIFS or NFS.

Dell Engineering
January 2014

Sreelakshmi V
Pushkala Iyer
Charles Stracener
Siva Reddy
George Loegel
Revisions

<table>
<thead>
<tr>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>January 2014</td>
<td>Initial release</td>
</tr>
</tbody>
</table>

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## Contents

### Revisions ......................................................................................................................................................................................... 2

### Executive Summary .................................................................................................................................................................................. 4

### 1 Deployment and Configuration Guide for Remote Automated Diagnostics .................................................................................. 5

#### 1.1 Currently Supported Diagnostics ............................................................................................................................................... 6

#### 1.2 Configuration Prerequisites ..................................................................................................................................................... 6

#### 1.3 Remote Automated Diagnostics ............................................................................................................................................. 6

##### 1.3.1 Feature Details .................................................................................................................................................................... 6

##### 1.3.2 Workflow ............................................................................................................................................................................... 7

##### 1.3.3 Objective ............................................................................................................................................................................... 7

##### 1.3.4 Audience ............................................................................................................................................................................... 8

#### 1.4 Overview of Remote Automated Diagnostics ....................................................................................................................... 8

##### 1.4.1 Control Flow Diagram for RunePSADiagnostics .................................................................................................................. 8

##### 1.4.2 Control Flow Diagram for ExportePSADiagnosticsResult ............................................................................................... 9

##### 1.4.3 Using WS-Man .................................................................................................................................................................... 9

##### 1.4.4 Command to Run Diagnostics ....................................................................................................................................... 13

##### 1.4.5 Command to Verify Job Status ...................................................................................................................................... 14

##### 1.4.6 Command to Export ePSA Diagnostics Result ............................................................................................................. 15

##### 1.4.7 Command to Verify Job Status ...................................................................................................................................... 16

#### 1.5 Using RACADM ..................................................................................................................................................................16

### 2 Conclusion .................................................................................................................................................................................... 18

#### 2.1 Learn more ......................................................................................................................................................................... 18

#### 2.2 About the Authors ............................................................................................................................................................ 18
Executive Summary

This technical white paper describes the task to remotely run hardware diagnostics and export the results of the last completed diagnostics to a remote network share (CIFS or NFS) using command line interfaces (CLI) and running appropriate WS-Man or RACADM commands.
1 Deployment and Configuration Guide for Remote Automated Diagnostics

In the current work atmosphere, any IT organization has to troubleshoot a wide range of potential issues that may arise in enterprise production environments. Any organization stores its data in its servers which are prone to problems, resulting in the downtime of servers. Server diagnostics is one of the best tools, which comes to the rescue of these organizations. In order to avoid downtime, Dell server diagnostics tools are designed to provide early warning about server health conditions. These diagnostics tools prevent any possible downtime and also provide an effective method of fault isolation. These tools also help in root cause analysis, whenever hardware failures occur. Briefly, Dell server diagnostics tools give an alarm at the right time to prevent any possible server downtime, whereby, the organizations and its clients are at safe hands.

Along with Hardware diagnostics, Dell also provides the following features for troubleshooting:

- DSET (Dell System E-support tool) to collect the hardware, storage, and operating system details from the servers.
- Tech-Support Report (TSR) allows for remotely gathering inventory (hardware details) information
- Remote automated diagnostics need the ‘prerequisites’ such as iDRAC firmware, Lifecycle Controller, BIOS, and diagnostics DUPs. Enterprise diagnostics are divided into three types:
  1. **Express:** The Express diagnostics runs a test package for each server subsystem, but does not run the full set of tests available in the package for each subsystem. Test package contains the tests of system, storage, disk memory, etc.
  2. **Extended:** The Extended diagnostics runs all available tests in each test package for all subsystems. The diagnostics tool runs on the host and the longest run is not expected to take longer than eight hours (heuristics based of 4TB hard disk drive (HDD) test estimate. All HDDs are tested in parallel) even if both Express and Extended tests are run.
  3. **LongRun:** The long run diagnostics runs both Express and Extended tests.
1.1 Currently Supported Diagnostics

1. **Server Diagnostics Tool**: You must start the server with utility partition. Download a utility, and then create a bootable disk space to run diagnostics.

2. **Lifecycle Controller**: Lifecycle Controller supports manual and local diagnostics for the target systems. To boot to UEFI and locally start diagnostics, press <F10> or <F11>.

Note: However, the diagnostics feature provides only local control and output.

Dell introduced the "Remote Automated Diagnostics" in the 12th generation server and later with the following versions:

- iDRAC 1.50.50 and later
- Lifecycle Controller2 1.3.0 and later
- BIOS 1.5.1 and later

1.2 Configuration Prerequisites

- A software license for 12th generation Dell PowerEdge servers.

For more information about managing licenses using iDRAC Web interface, log on to iDRAC, click **Overview > Server > Licenses**, and then read the iDRAC Online Help information by pressing the question mark symbol (?) in the upper-right corner of the page.

- The server must have a valid service tag (seven characters).
- You must have login and server control privileges.
- Updated firmware versions of (12th generation) iDRAC, Lifecycle Controller, BIOS, and Diagnostics DUPs.
- Express license. There is no feature license.

Constraints

- Only one diagnostics job can be scheduled and run at a time.

1.3 Remote Automated Diagnostics

This feature provides you the ability to remotely run hardware diagnostics and export the results of the last completed diagnostics to a remote network share (CIFS/NFS) using commands such as WS-Man and RACADM.

1.3.1 Feature Details

The major features for remote automated diagnostics are as follows:

- A diagnostics is run as a Lifecycle Controller job.
- A remote diagnostics can be run at a scheduled time.
• A diagnostics job can be run immediately.
• You must specify a reboot type with a job. For more information about reboot types, see section 1.4.3 of this white paper.
• Pending diagnostics jobs can be cancelled.
• A job can be specified to run as an Express, or Extended, or else LongRun diagnostics type.
• Diagnostics selections will not run tests that require a user interaction.
• Errors indicating failures will be in the Lifecycle Controller log.
• Overall results of successful or unsuccessful diagnostics is sent using Simple Network Management Protocol (SNMP) and WS-Eventing.
• The results from last diagnostics run are available and retrievable remotely. Lifecycle Controller job status such as ‘completed’ or ‘failed’ are stored in the Lifecycle Controller log. The result file produced by diagnostics can be retrieved remotely using RACADM or new WS-Man method.
• SNMP traps are not newly added as part of this feature.

**1.3.2 Workflow**

- You can select to either the start time of a schedule or you can start immediately.
- Select type of diagnostics to run
  - Express
  - Extended
  - LongRun
- Create Diagnostics job.
- After a job is successfully run, server will boot into UEFI and launch Diagnostics in unattended mode. A job is shown as running, but percentage completion status of a job is not shown in the form of a status bar.
- After the completion of a job, results file from the most recent completed run is available.
- Start exporting the results to a target destination (CIFS or NFS share).
- Export of job may take more than five seconds on the basis network performance and size of file.

**1.3.3 Objective**

This feature will allow you to remotely run hardware diagnostics through console application or remote scripts, and collect results by running appropriate commands. Interfaces such as WS-Man and RACADM provide a mechanism to run the diagnostics and export the results of the last completed diagnostics to a remote network share (CIFS or NFS) in a text format.
### 1.3.4 Audience

Make sure that the following prerequisites are met before performing Remote Diagnostics:

- A software license for 12th generation Dell PowerEdge servers. For more information about managing licenses using iDRAC Web interface, log in to iDRAC, click **Overview > Server > Licenses**, and then read the iDRAC Online Help information by pressing the question mark symbol (?) in the upper-right corner of the page.
- You must have login and server control privileges.
- Latest Diagnostics must be installed on the system.

### 1.4 Overview of Remote Automated Diagnostics

Remote Automated Diagnostics provides two methods to perform the diagnostics and export the results.

1. **RunePSADiagnostics**: This method is used to run the diagnostics job based on the runmode switch and save the report in the internal storage area. The diagnostics job can be run in either express or extended mode, or as a long run which encompasses all diagnostics tests.

   **Note**: A Diagnostics operation may not take more than eight hours.

2. **ExportePSADiagnosticsResult**: This method exports the result file of the last completed diagnostics into the respective remote share directory (CIFS or NFS). The result file will have time stamps to show when the diagnostics was run.

### 1.4.1 Control Flow Diagram for **RunePSADiagnostics**
1.4.2 Control Flow Diagram for `ExportePSADiagnosticsResult`

![Control Flow Diagram for ExportePSADiagnosticsResult](image)

1.4.3 Using WS-Man

These methods `RunePSADiagnostics` and `ExportePSADiagnosticsResult` are added in the DCIM_LCService provider.

Table 1 RunePSADiagnostics () Method: Return Code Values

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Error occurred</td>
</tr>
<tr>
<td>4096</td>
<td>Job started: REF returned to started CIM_ConcreteJob</td>
</tr>
</tbody>
</table>

Table 2 RunePSADiagnostics () Method: Parameters

<table>
<thead>
<tr>
<th>Qualifiers</th>
<th>Name</th>
<th>Type</th>
<th>Description/Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN, REQ</td>
<td>RunMode</td>
<td>Uint32</td>
<td>Type of diagnostics to run. 0 – is the express tests. 1- is extended set of tests. 2 – LongRun (all tests)</td>
</tr>
<tr>
<td>IN</td>
<td>RebootJobType</td>
<td>Uint32</td>
<td>Creates a specific reboot job to power cycle the host system. This parameter only creates the RebootJob and does not schedule it. Shall contain the requested reboot type: 1 - PowerCycle 2 - Graceful Reboot without</td>
</tr>
<tr>
<td>Parameter</td>
<td>Description</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------</td>
<td>-------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ScheduledStartTime</strong></td>
<td>String &lt;br&gt;Schedules the configuration job and the optional reboot job at the specified start time. A special value of “TIME_NOW” schedules the job(s) immediately. Start time for the job execution in format: yyyymmddhhmmss. The string “TIME_NOW” means immediate.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>UntilTime</strong></td>
<td>String &lt;br&gt;Defines a time window for scheduling the job(s). However, this parameter depends on “ScheduledStartTime” and “ScheduledEndTime” parameters. After scheduled, jobs will be run within the time window. End time for the job execution in format: yyyymmddhhmmss. If this parameter is not NULL, then ScheduledStartTime parameter shall also be specified.</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Job</strong></td>
<td>CIM_ConcreteJob REF &lt;br&gt;A reference to the ConcreteJob is returned</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MessageID</strong></td>
<td>String &lt;br&gt;Error MessageID is returned if the method fails to run</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Message</strong></td>
<td>String &lt;br&gt;Error Message in English corresponding to the MessageID</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MessageArguments</strong></td>
<td>String[] &lt;br&gt;Any dynamic string substitutions for the Message</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 3  
RunePSADiagnostics() Method: Standard Messages

<table>
<thead>
<tr>
<th>MessageID (OUT parameter)</th>
<th>Message</th>
<th>MessageArguments[]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS095</td>
<td>Unable to unmount an iDRAC internal storage partition.</td>
<td></td>
</tr>
<tr>
<td>SYS096</td>
<td>Required ePSA Diagnostics binary does not exist.</td>
<td></td>
</tr>
<tr>
<td>SYS098</td>
<td>A Remote Diagnostics (ePSA) job already exists.</td>
<td></td>
</tr>
</tbody>
</table>

Table 4  
ExportePSADiagnosticsResult() Method: Return Code Values

<table>
<thead>
<tr>
<th>Value</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Error occurred</td>
</tr>
<tr>
<td>4096</td>
<td>Job started: REF returned to started CIM_ConcreteJob</td>
</tr>
</tbody>
</table>

Table 5  
ExportePSADiagnosticsResult() Method: Parameters

<table>
<thead>
<tr>
<th>Qualifiers</th>
<th>Name</th>
<th>Type</th>
<th>Description/Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>IN, REQ</td>
<td>IPAddress</td>
<td>String</td>
<td>IP address of network share</td>
</tr>
<tr>
<td>IN, REQ</td>
<td>ShareName</td>
<td>String</td>
<td>Network sharepoint address</td>
</tr>
<tr>
<td>IN, REQ</td>
<td>FileName</td>
<td>String</td>
<td>Diagnostics Result File name</td>
</tr>
<tr>
<td>IN, REQ</td>
<td>ShareType</td>
<td>Uint8</td>
<td>Type of network share (NFS=0 and CIFS=2)</td>
</tr>
<tr>
<td>IN</td>
<td>Username</td>
<td>String</td>
<td>The username to be used to access the network share for the export result</td>
</tr>
<tr>
<td>IN</td>
<td>Password</td>
<td>String</td>
<td>The password to be used to access the network share</td>
</tr>
<tr>
<td>OUT</td>
<td>Job</td>
<td>CIM_ConcreteJob</td>
<td>A reference to the ConcreteJob is returned</td>
</tr>
<tr>
<td>OUT</td>
<td>MessageID</td>
<td>String</td>
<td>Error MessageID is returned if the method fails to run</td>
</tr>
<tr>
<td>OUT</td>
<td>Message</td>
<td>String</td>
<td>Error Message in English corresponding to the MessageID</td>
</tr>
<tr>
<td>OUT</td>
<td>MessageArguments</td>
<td>String[]</td>
<td>Any dynamic string substitutions for the Message</td>
</tr>
<tr>
<td>OUT</td>
<td>MessageID</td>
<td>String</td>
<td>Error MessageID is returned if the method fails to run</td>
</tr>
</tbody>
</table>
### Table 6: `ExportePSADiagnosticsResult()` Method: Standard Messages

<table>
<thead>
<tr>
<th>MessageID (OUT parameter)</th>
<th>Message</th>
<th>MessageArguments[]</th>
</tr>
</thead>
<tbody>
<tr>
<td>SYS083</td>
<td>Unable to export ePSA Diagnostics results because iDRAC internal storage could not be accessed.</td>
<td>Parameter name, see in the above mentioned Table.</td>
</tr>
<tr>
<td>SYS084</td>
<td>Export of ePSA Diagnostics results did not complete successfully because the iDRAC internal storage containing the results could not be accessed.</td>
<td></td>
</tr>
<tr>
<td>SYS085</td>
<td>Successfully exported the ePSA Diagnostics results.</td>
<td></td>
</tr>
<tr>
<td>SYS086</td>
<td>Unable to copy the ePSA Diagnostics results file to the network share.</td>
<td></td>
</tr>
<tr>
<td>SYS095</td>
<td>Unable to unmount an iDRAC internal storage partition.</td>
<td></td>
</tr>
<tr>
<td>SYS096</td>
<td>Required ePSA Diagnostics binary does not exist.</td>
<td></td>
</tr>
<tr>
<td>SYS098</td>
<td>A Remote Diagnostics (ePSA) job already exists.</td>
<td></td>
</tr>
<tr>
<td>SYS099</td>
<td>Unable to export the diagnostics results because the results do not exist.</td>
<td></td>
</tr>
</tbody>
</table>
### 1.4.4 Command to Run Diagnostics

```bash
winrm i RunePSADiagnostics http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LCService?SystemCreationClassName=DCIM_ComputerSystem+CreationClassName=DCIM_LCService+SystemName=DCIM:ComputerSystem+Name=DCIM:LCService -u:%Username% -p:%Password% -r:https://%IPAddress%/wsman -SkipCNCheck -SkipCACheck -encoding:utf-8 -a:basic @{RunMode="1";RebootJobType="2";ScheduledStartTime="TIME_NOW"}
```

**Note:** Job will be created after a command is successfully run.

**Example:**

```bash
```

**RunePSADiagnostics_OUTPUT**

```
Job

EndpointReference

Address = http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

ReferenceParameters


SelectorSet

Selector: InstanceID = JID_668777011296, __cimnamespace = root/dcim

ReturnValue = 4096
```
1.4.5 Command to Verify Job Status

```
winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LifeCyclejob -u:%Username% -p:%Password% -r:https://%IPAddress%/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8-a:basic
```

Example

```
```

```
DCIM_LifeCyclejob

ElapsedTimeSinceCompletion = null
InstanceID = JID_660055291735
JobStartTime = TIME_NOW
JobStatus = Scheduled
JobUntilTime = TIME_NA
Message = Task successfully scheduled.
MessageArguments = NA
MessageID = JCP001
Name = Remote Diagnostics
PercentComplete = 0
```

```
DCIM_LifeCyclejob

ElapsedTimeSinceCompletion = 1
InstanceID = RID_660055293253
JobStartTime = TIME_NOW
JobStatus = Reboot Completed
JobUntilTime = TIME_NA
Message = Reboot is complete.
MessageArguments = NA
```
MessageID = RED030
Name = Reboot3
PercentComplete = NA

1.4.6 Command to Export ePSA Diagnostics Result

winrm i ExportePSADiagnosticsResult http://schemas.dmtf.org/wbem/wscim/1/cim-sch-
ema/2/root/dcim/DCIM_LCService?SystemCreationClassName=DCIM_ComputerSystem +CreationClassName=DCIM_LCService+SystemName=DCIM:ComputerSystem+Name=DCIM:LC
Service -u:root -p:calvin -r:https://10.94.161.123/wsman -SkipCNCheck -
SkipCACheck -encoding:utf-8 -a:basic
@{IPAddress="%SharepathIPAddress%";ShareName="%ShareName%";ShareType="%ShareT
ype%";Username="%UserName%";Password="%PassWord%";FileName="%FileName%"}

Example

winrm i ExportePSADiagnosticsResult http://schemas.dmtf.org/wbem/wscim/1/cim-
schema/2/root/dcim/DCIM_LCService?SystemCreationClassName=DCIM_ComputerSystem +CreationClassName=DCIM_LCService+SystemName=DCIM:ComputerSystem+Name=DCIM:LC
Service -u:root -p:calvin -r:https://10.94.161.123/wsman -SkipCNCheck -
SkipCACheck -encoding:utf-8 -a:basic
@{IPAddress="10.94.192.100";ShareName="CommonShare";ShareType="2";Username="dra
rac";Password="tiger";FileName="psa.txt"}

ExportePSADiagnosticsResult_OUTPUT

Job

EndpointReference

Address =
http://schemas.xmlsoap.org/ws/2004/08/addressing/role/anonymous

ReferenceParameters

ResourceURI = http://schemas.dell.com/wbem/wscim/1/cim-sch-
ema/2/DCIM_LifecycleJob

SelectorSet

Selector: InstanceID = JID_668771356675, __cimnamespace =
root/dcim

ReturnValue = 4096
1.4.7 Command to Verify Job Status

winrm e http://schemas.dmtf.org/wbem/wscim/1/cim-schema/2/root/dcim/DCIM_LifeCyclejob -u:%Username% -p:%Password% -r:https://%IPAddress%/wsman -SkipCNcheck -SkipCAcheck -encoding:utf-8-a:basic

1.5 Using RACADM

RACADM being a command line interface (CLI) feature, you can enter a script to run the commands for quick results.

The racadm diagnostics command options are as follows:

- **-m <Mode>**  
  Type of diagnostics mode  
  0: Express  
  1: Extended  
  2: Both

- **-f**  
  Name of the Configuration file.

- **-l**  
  Network Share Location.

- **-u**  
  Username of the remote share from where the file will be imported.

- **-p**  
  Password of the remote share from where the file will be imported.

- **-r <reboot type>**  
  Type can be one of the following  
  pwrcycle: PowerCycle  
  Graceful: Graceful Reboot without forced shutdown  
  Forced: Graceful Reboot with forced shutdown

- **-s <Start Time>**  
  Specifies a start time for job to be scheduled in yyyymmdhhmmss format.  
  TIME_NOW means immediate (default)

- **-e <Expiration Time>**  
  Specifies expiry time for the job execution in yyyymmdhhmmss format.  
  TIME_NA means wait time not applicable (default)

To run Remote Diagnostics

$racadm diagnostic run -m <Mode> -r <reboot type> -s <Start Time> -e <Expiration Time>

Modes can be: 0-express, 1-Extended, 2-Both.

Reboot types can be: Graceful, Forced or pwrcycle.

Start Time can be: TIME_NOW, TIME_NA or time needs to be entered using “yyyymmdhhmmss” format.

Expiration Time: Time needs to be entered using “yyyymmdhhmmss” format.
Usage Examples

```
/tmp/manju # racadm diagnostics run -m 1 -r graceful
Remote Diagnostics Run is Successful
```

To Export the RemoteDiagnostics report

```
racadm diagnostic export -f <file name> -l <NFS / CIFS share> -u <username> -p <password>
```

Note: Export command should be executed only after the run command is being executed.

Usage Examples

```
/tmp$ racadm diagnostics export -f test -l //10.94.162.74/hari -u administrator -p dell_123
Remote Diagnostics Export is Successful
```
2 Conclusion
This feature enables you to remotely initiate a diagnostics run on multiple systems during system maintenance, and to collate the run logs at a later time. Proactively, running diagnostics on the servers in a data center enables a system administrator to diagnose hardware issues before they actually occur.

2.1 Learn more
For more information about the enterprise-class servers of Dell, go to Dell.com/PowerEdge

2.2 About the Authors
Sreelakshmi V, Pushkala Iyer, Charles Stracener, Siva Reddy, and George Loegel are software developers in the iDRAC and WS-Man teams of Lifecycle Controller.