

Automated Out-of-Band management with Ansible and Redfish

Jose Delarosa – Senior Linux Engineer at Dell EMC
Jake Jackson – Product Field Engineer at Ansible by Red Hat
May 2nd, 2017

Who are we

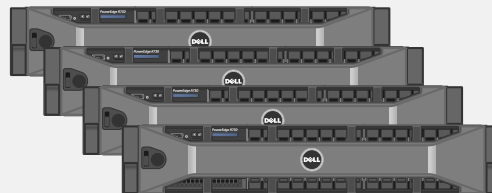
- Jose De la Rosa (@jdelaros1)
 - Linux Engineer at Dell EMC.
 - Systems engineer, emerging technologies evangelist.
- Jake Jackson (@thedoubl3j)
 - Product Field Engineer at Ansible by Red Hat.
 - Works with the Getting Started team helping customers with standing up and getting started with Ansible.

Before we start

1. Thank you for coming.
2. Please ask questions at any time.
3. If time runs out, we will be happy to talk to you after the session.

Content

1. Out-of-band management with PowerEdge iDRAC
2. Scalable out-of-band management with Redfish
3. Automated out-of-band management with Ansible

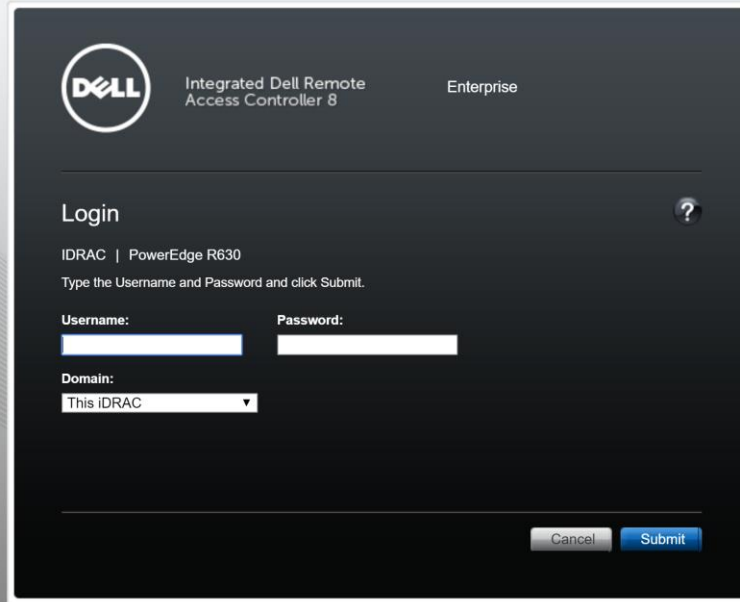



iDRAC Overview


Integrated Dell Remote Access Controller (iDRAC)

- Embedded chip on a PowerEdge server used to run tasks that are independent of the host OS and the rest of the server.
 - Detects hardware failure
 - Manage power: turn off, on, hard reset
 - System event and lifecycle logs
- Has its own ethernet port, usually connected to separate management network.
- Referred to as “out-of-band” management, as opposed to “in-band” management which is provided by the OS.

Web UI Login



 Integrated Dell Remote Access Controller 8 Enterprise

Login 

IDRAC | PowerEdge R630
Type the Username and Password and click Submit.

Username:

Password:

Domain:

[Support](#) | [Dell TechCenter](#) | [About](#)

Main page

System
PowerEdge T630
root, Admin

Overview
Server

- Logs
- Power / Thermal
- Virtual Console
- Alerts
- Setup
- Troubleshooting
- Licenses
- Intrusion
- + iDRAC Settings
- Hardware
- Batteries
- Fans
- CPU
- Memory
- Front Panel
- Network Devices
- Power Supplies
- Removable Flash Media
- USB Management Port
- Storage
- Physical Disks
- Virtual Disks
- Controllers
- Enclosures
- + Host OS

Properties: Attached Media, vFlash, Service Module, Job Queue

Summary: Details, System Inventory

System Summary

Server Health

- ✓ Batteries
- ✓ Fans
- ✓ Intrusion
- ✓ Power Supplies
- ✓ Removable Flash Media
- ✓ Temperatures
- ✓ Voltages

Virtual Console Preview

No Signal

- > Settings
- > Refresh
- > Launch

Server Information

Power State	ON
System Model	PowerEdge T630
System Revision	1
System Host Name	localhost.localdomain
Operating System	Red Hat Enterprise Linux Server
Operating System Version	release 7.3 (Maipo) Kernel 3.10.0-514.10.2...
Service Tag	5XR7Q22
Express Service Code	12925005482
BIOS Version	2.3.4

Quick Launch Tasks

- Power ON / OFF
- Power Cycle System (cold boot)
- System ID LED ON/OFF
- View Logs
- Update and Rollback
- Reset iDRAC

Storage controller status

The screenshot displays the Dell iDRAC Enterprise interface for a PowerEdge T630 server. The top navigation bar includes the Dell logo, 'Integrated Dell Remote Access Controller 8', and 'Enterprise'. The left sidebar shows a navigation tree with 'Controllers' highlighted and 'Storage' also highlighted with a red box. The main content area is titled 'Controllers' and has sub-tabs for 'Properties', 'Setup', and 'Troubleshooting'. Under 'Health and Properties', a table lists the storage controller. A red box highlights the first row of this table. Below it, a 'Controller Battery' table shows the battery status.

System
PowerEdge T630
root , Admin

Controllers
Properties | Setup | Troubleshooting

Health and Properties

Status	Name	Device Description	PCI Slot	Firmware Version	
+	✓	PERC H730 Adapter (PCI Slot 8)	RAID Controller in Slot 8	8	25.5.0.0018

Controller Battery


Status	Battery Name	Device Description	State	C
✓	Battery	Battery on RAID Controller in Slot 8	Ready	F

Power & thermal readings

The screenshot displays the Dell iDRAC Enterprise interface for a PowerEdge T430 server. The left sidebar contains a navigation menu with 'Power / Thermal' highlighted. The main content area is divided into three sections: Power Supply Unit Readings, Cumulative Reading, and Historical Peaks. A fourth section, 'Historical Trends', is highlighted with a red box and contains a table with columns for Time, Average Usage, Max Peak, Max Peak Time, and Min Peak. The data in this table is as follows:

Time	Average Usage	Max Peak	Max Peak Time	Min Peak
Last Hour	152 W 519 BTU/hr	168 W 573 BTU/hr	Sun Apr 23 21:22:45 2017	148 W 505 BTU/hr
Last Day	155 W 529 BTU/hr	195 W 666 BTU/hr	Sun Apr 23 15:11:49 2017	147 W 502 BTU/hr
Last Week	153 W 522 BTU/hr	195 W 666 BTU/hr	Sun Apr 23 15:11:49 2017	147 W 502 BTU/hr

System event logs



Integrated Dell Remote Access Controller 8 Enterprise

System
PowerEdge T430
root, Admin

- Overview
- Server
 - Logs
 - Power / Thermal
 - Virtual Console
 - Alerts
 - Setup
 - Troubleshooting
 - Licenses
 - Intrusion
- + iDRAC Settings
- + Hardware
- + Storage
- + Host OS

Logs

Logs | Settings | Lifecycle Log

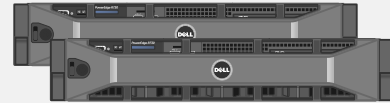
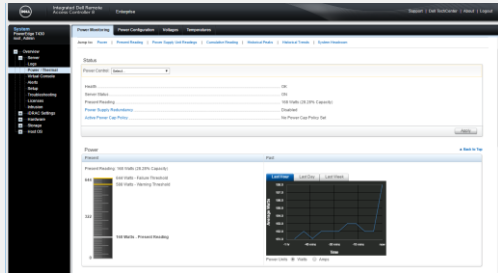
System Event Log

Options: > [Advanced Settings](#)

System Event Log

Severity	Date/Time	Description
Instructions: The System Event Log contains information about the managed system. To sort the log by column, click a column header.		
✓	Tue Feb 14 2017 00:55:11	Drive 4 is installed in disk drive bay 1.
✓	Tue Feb 14 2017 00:55:01	Drive 4 in disk drive bay 1 is operating normally.
✗	Tue Feb 14 2017 00:55:01	Drive 4 is removed from disk drive bay 1.
✗	Sun Feb 12 2017 01:01:55	Fault detected on drive 4 in disk drive bay 1.
✓	Fri Oct 09 2015 13:40:30	Log cleared.

Simple Out-of-band management



1 - 5 servers

Redfish Overview

What is Redfish?



- RESTful API specification defined by the DMTF for hardware management.
- Aims to replace IPMI and vendor-specific interfaces like WSMAN.
- Schema-based but human-readable.
- Clients send URI requests over https to iDRAC, so clients can be any OS or application on a server, workstation or mobile device.

What can Redfish do?

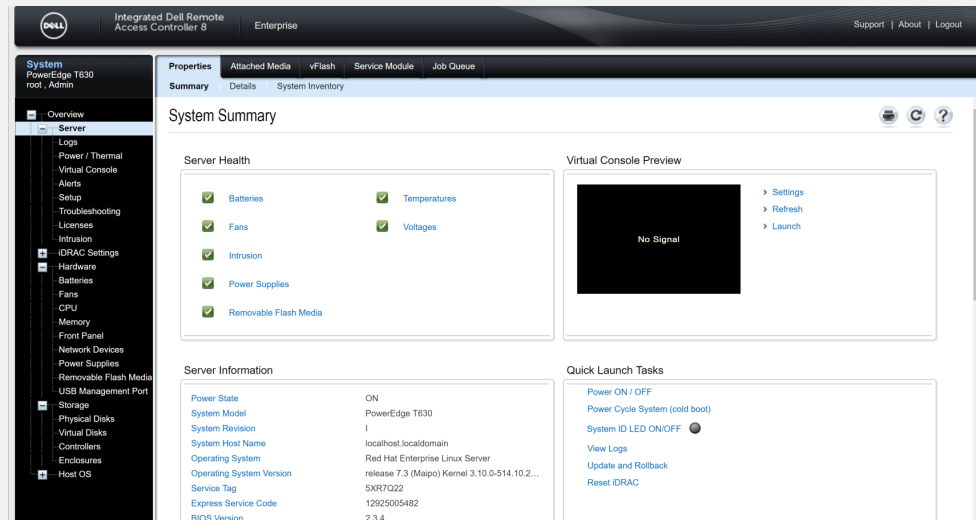


- Monitor server health status
- Alert on server health status changes
- View server hardware inventory and firmware versions
- Reset, reboot, and power control servers
- Access system logs

Example: Get system health

```
$ curl -s https://<idrac_ip>/redfish/v1/Systems/System.Embedded.1 -k -u  
root:password | python -m json.tool | jq .Status
```

```
{  
  "Health": "OK",  
  "HealthRollUp": "OK",  
  "State": "Enabled"  
}
```



The screenshot displays the Dell iDRAC Enterprise web interface. The main content area shows the 'System Summary' page for a PowerEdge T630 server. The 'Server Health' section indicates that all components (Batteries, Fans, Intrusion, Power Supplies, Removable Flash Media, Temperatures, and Voltages) are in a 'Good' state, represented by green checkmarks. The 'Virtual Console Preview' section shows 'No Signal'. The 'Server Information' section provides details such as Power State (ON), System Model (PowerEdge T630), Operating System (Red Hat Enterprise Linux Server), and BIOS Version (2.3.4). The 'Quick Launch Tasks' section includes options like 'Power ON / OFF', 'Power Cycle System (cold boot)', and 'System ID LED ON/OFF'.

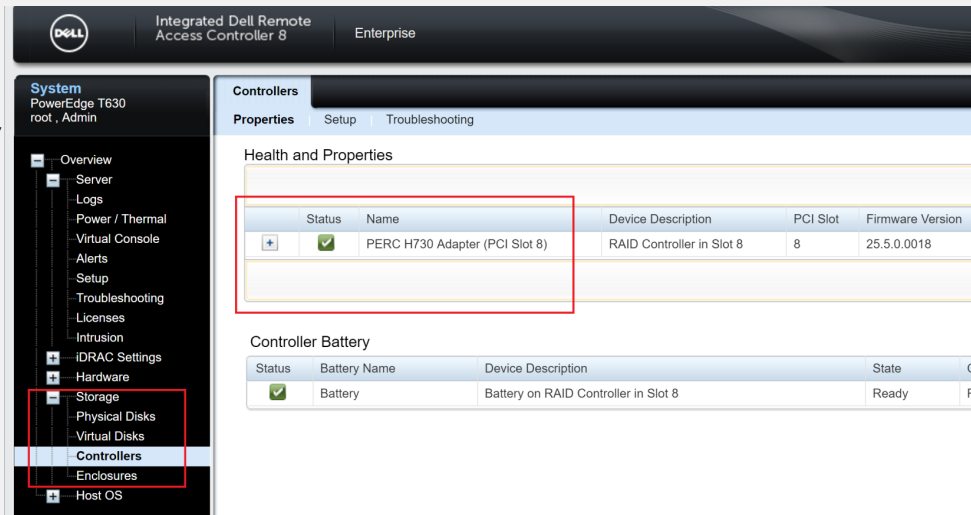
Example: Get storage controller health

```
$ curl -s  
https://<idrac_ip>/redfish/v1/Systems/System.Embedded.1/Storage/Controllers/RAID.  
Slot.8-1 -k -u root:password | python -m json.tool | jq .Name
```

"PERC H730 Adapter"

```
$ curl -s  
https://<idrac_ip>/redfish/v1/Systems/  
Slot.8-1 -k -u root:password | python
```

```
{  
  "Health": "OK",  
  "HealthRollUp": "OK"  
}
```



The screenshot displays the Dell iDRAC Enterprise interface for a PowerEdge T630 server. The left sidebar shows a navigation menu with 'Controllers' highlighted. The main content area is titled 'Controllers' and includes a 'Properties' tab. Under 'Health and Properties', a table lists the RAID controller's status as 'OK'. Below this, a 'Controller Battery' section shows the battery status as 'Ready'.

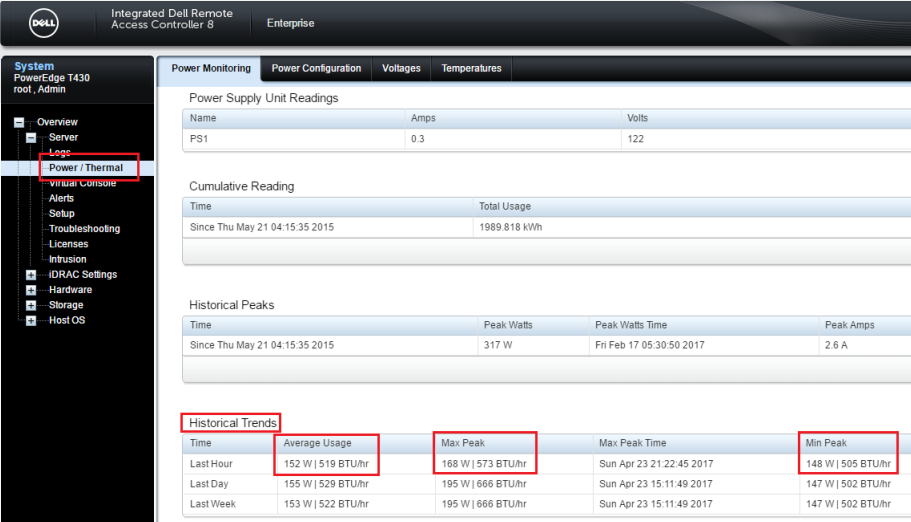
Status	Name	Device Description	PCI Slot	Firmware Version	
+	✓	PERC H730 Adapter (PCI Slot 8)	RAID Controller in Slot 8	8	25.5.0.0018

Status	Battery Name	Device Description	State
✓	Battery	Battery on RAID Controller in Slot 8	Ready

Example: Get power consumption during last hour

```
$ curl -s  
https://<idrac_ip>/redfish/v1/Chassis/System.Embedded.1/Power/PowerControl -k -u  
root:password | python -m json.tool | jq .PowerMetrics
```

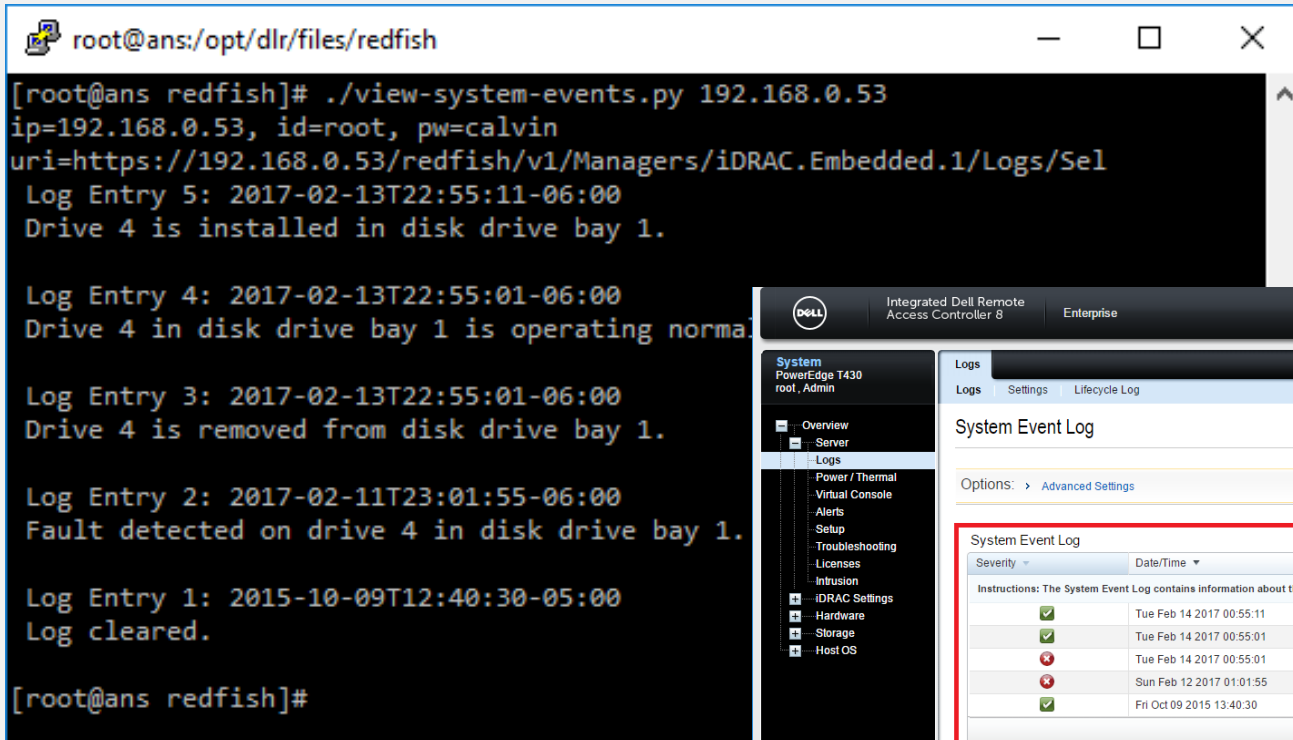
```
{  
  "AverageConsumedWatts": 152,  
  "IntervalInMin": 60,  
  "MaxConsumedWatts": 168,  
  "MinConsumedWatts": 148  
}
```



The screenshot displays the Dell iDRAC Power Monitoring interface. The left sidebar shows the navigation menu with 'Power / Thermal' highlighted. The main content area shows 'Power Monitoring' with tabs for 'Power Configuration', 'Voltages', and 'Temperatures'. The 'Power Supply Unit Readings' table shows one PSU with 0.3 Amps and 122 Volts. The 'Cumulative Reading' table shows total usage since Thu May 21 04:15:35 2015 as 1989.818 kWh. The 'Historical Peaks' table shows a peak of 317 W on Fri Feb 17 05:30:50 2017. The 'Historical Trends' table shows the following data:

Time	Average Usage	Max Peak	Max Peak Time	Min Peak
Last Hour	152 W 519 BTU/hr	168 W 573 BTU/hr	Sun Apr 23 21:22:45 2017	148 W 505 BTU/hr
Last Day	155 W 529 BTU/hr	195 W 666 BTU/hr	Sun Apr 23 15:11:49 2017	147 W 502 BTU/hr
Last Week	153 W 522 BTU/hr	195 W 666 BTU/hr	Sun Apr 23 15:11:49 2017	147 W 502 BTU/hr

Example: Get system event logs



```
root@ans:/opt/dlr/files/redfish
[root@ans redfish]# ./view-system-events.py 192.168.0.53
ip=192.168.0.53, id=root, pw=calvin
uri=https://192.168.0.53/redfish/v1/Managers/iDRAC.Embedded.1/Logs/Sel
Log Entry 5: 2017-02-13T22:55:11-06:00
Drive 4 is installed in disk drive bay 1.

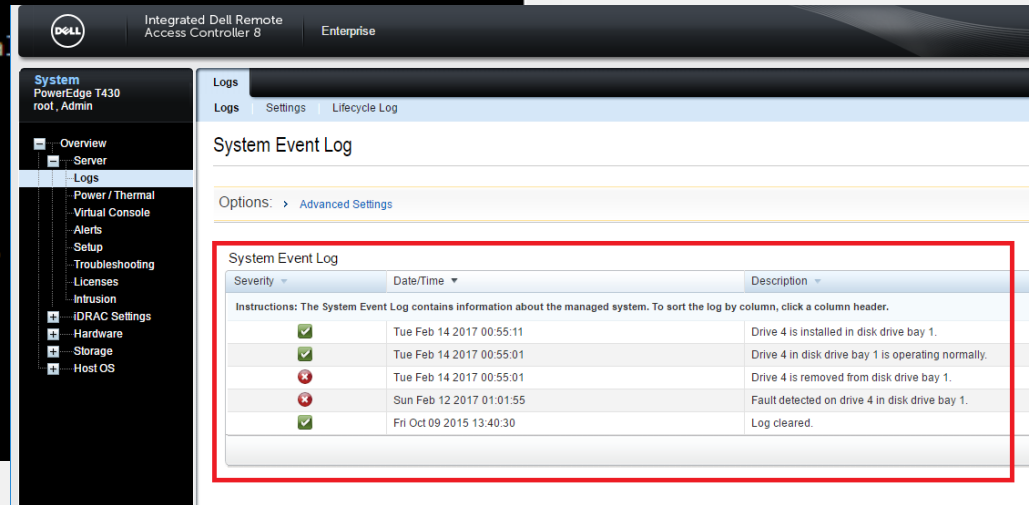
Log Entry 4: 2017-02-13T22:55:01-06:00
Drive 4 in disk drive bay 1 is operating normal.

Log Entry 3: 2017-02-13T22:55:01-06:00
Drive 4 is removed from disk drive bay 1.

Log Entry 2: 2017-02-11T23:01:55-06:00
Fault detected on drive 4 in disk drive bay 1.

Log Entry 1: 2015-10-09T12:40:30-05:00
Log cleared.

[root@ans redfish]#
```



Integrated Dell Remote Access Controller 8 Enterprise

System PowerEdge T430
root, Admin

Overview Server
Logs
Power / Thermal
Virtual Console
Alerts
Setup
Troubleshooting
Licenses
iDRAC Settings
Hardware
Storage
Host OS

Logs Settings Lifecycle Log

System Event Log

Options: [Advanced Settings](#)

Severity	Date/Time	Description
✓	Tue Feb 14 2017 00:55:11	Drive 4 is installed in disk drive bay 1.
✓	Tue Feb 14 2017 00:55:01	Drive 4 in disk drive bay 1 is operating normally.
✗	Tue Feb 14 2017 00:55:01	Drive 4 is removed from disk drive bay 1.
✗	Sun Feb 12 2017 01:01:55	Fault detected on drive 4 in disk drive bay 1.
✓	Fri Oct 09 2015 13:40:30	Log cleared.

What else can Redfish do?



Retrieve Telemetry

- Basic server identification and asset information
- Health state
- Temperature sensors and fans
- Power consumption and thresholds

Discovery

- Service endpoint (network-based discovery)
- System

Basic I/O

- Host
- Simple

Security

- Session-based leveraging HTTPS

Common Management Actions

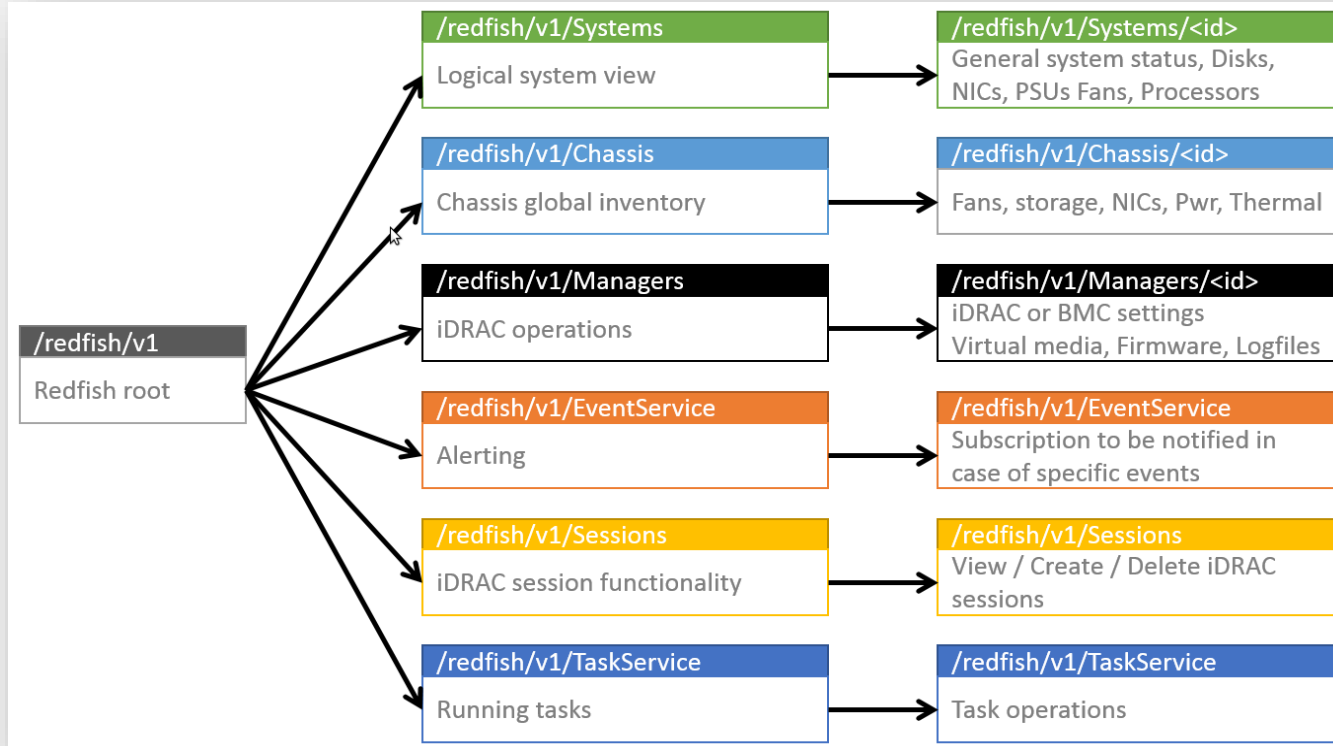
- Reboot / power cycle
- Change boot order
- Configure BMC network settings
- Manage user accounts

Access and Notification

- Serial console access via SSH
- Alert / event notification
- Event log access

More Coming Soon!
<https://www.dmtf.org/standards/redfish>

Redfish API tree structure



Redfish Roadmap

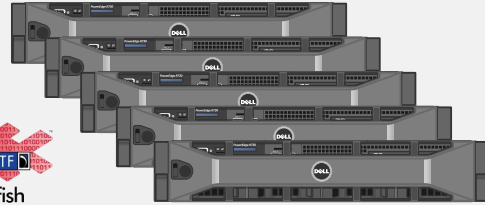
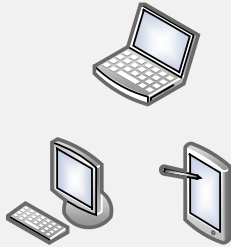


- Version 1 focused on servers. Expand over time to cover rest of IT infrastructure.
- Will add devices over time to cover new technologies (i.e. NVDIMMs, Multifunction Adapters)
- SNIA is developing *Swordfish*, which builds upon Redfish's local storage management to address advanced storage devices.
- Open source efforts:
 - Client libraries (Python, Java, PowerShell)
 - Command line utility *redfishtool* (similar to *ipmitool*)

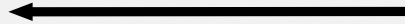
Scalable Out-of-band management



`https:// <idrac-ip>/ redfish/ v1/ Managers/ iDRAC.Embedded.1/ Logs/ Sel`



More than 5 servers



Server data

Ansible Overview

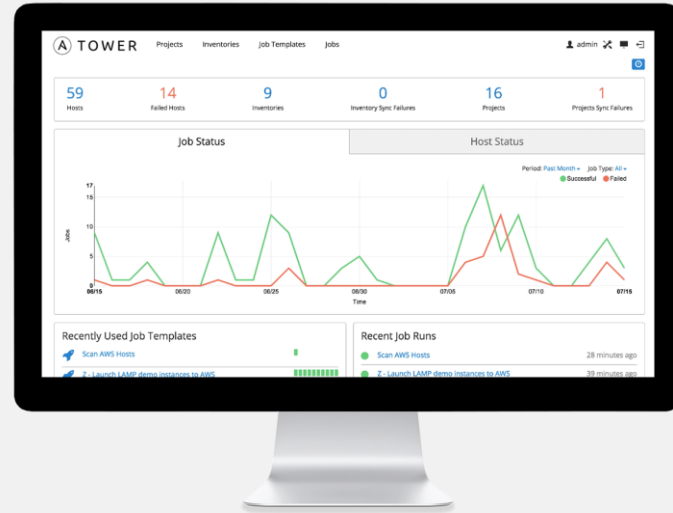
What is Ansible?



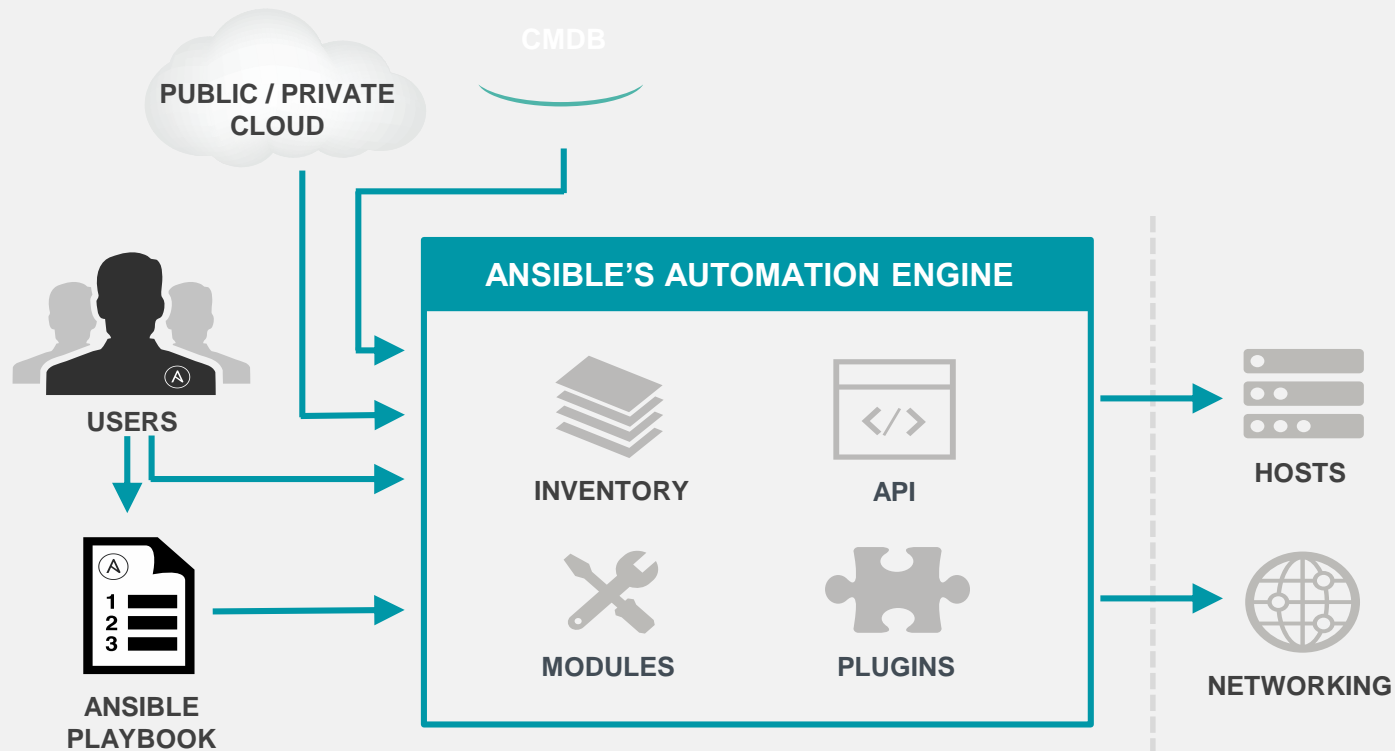
It's a **simple automation language** that can perfectly describe an IT application infrastructure in Ansible Playbooks.

It's an **automation engine** that runs Ansible Playbooks.

Ansible Tower is an **enterprise framework** for controlling, securing and managing your Ansible automation with a **UI and restful API**.



How Ansible works



More about Ansible



- Agentless → minimum footprint
- Make repetitive tasks easy
- Defines a desired state, so OK to run playbook more than once
- Easier to use than writing shell scripts

Ansible use cases



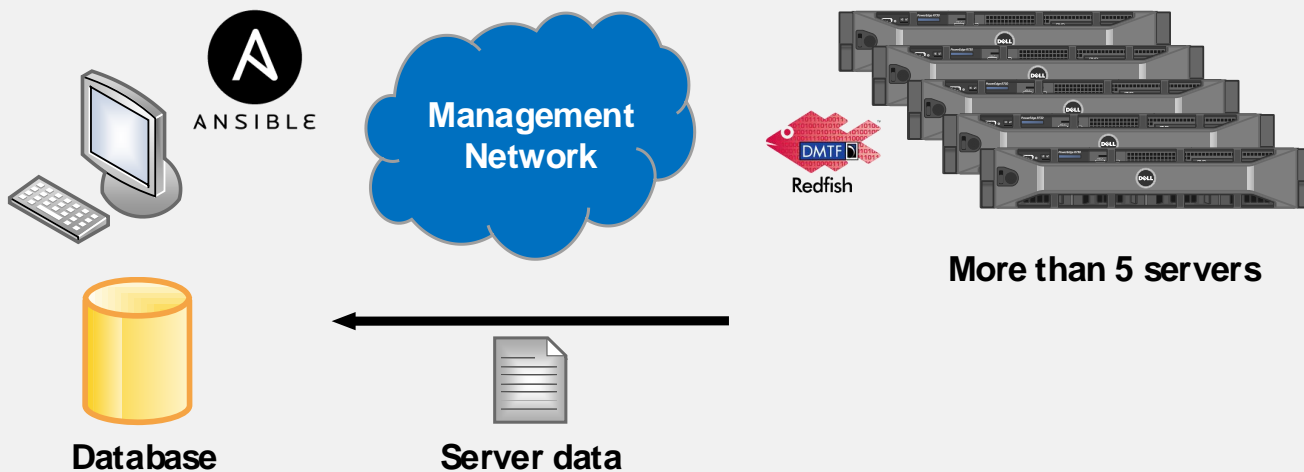
- Infrastructure Automation
 - Networking
 - Containers
 - Code Deployment
 - Server / Bare Metal
- Want more information? Visit www.ansible.com and docs.ansible.com

Ansible + Redfish + iDRAC together!

Scalable & Automated Out-of-band management



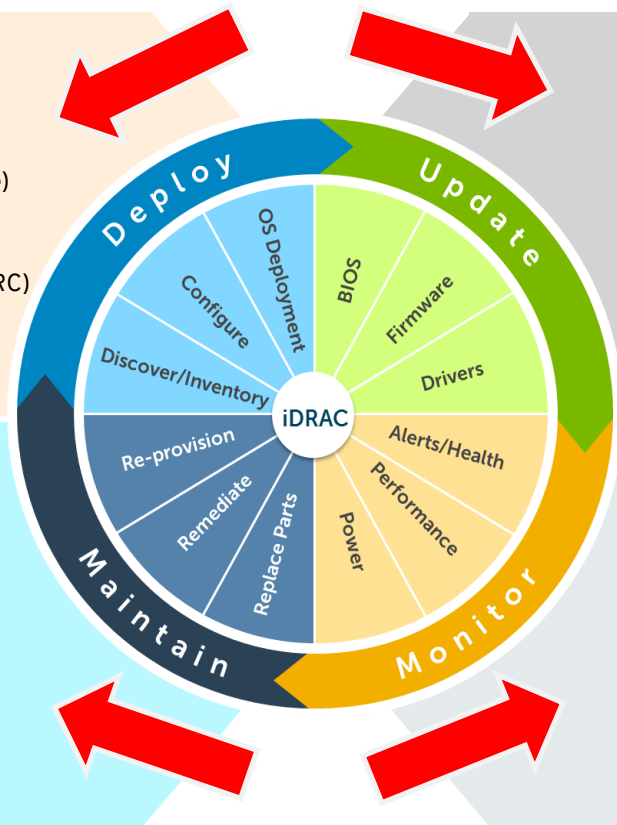
`https://<idrac-ip>/redfish/v1/Managers/iDRAC.Embedded.1/Logs/Sel`



Key Lifecycle Management tasks

- Server Power On/Off; Reboot; Hard Reset
- Install BIOS, Configure BIOS, Reset to Default
- Configure iDRAC (CRUD operations):
 - User & Password Management
 - Certificate Management (import, export, delete)
 - Network Configuration
 - NTP and Time Zone settings
 - Storage (RAID, Virtual Disk, Physical Disks, PERC)
- System Inventory – H/W, Firmware, Sensor
- OS Deployment – remote file share, vMedia
- Import / Export SCP – remote file share, vMedia

- Backup and Restore
 - Server Profiles



- Upgrade using DSU (Dell Server Update) or DUEC (Dell Update Engine for Consoles)
 - Get list of available and applicable updates
 - Firmware Upgrade
 - BIOS Upgrade
 - OS Drivers Upgrade
- Job Management
 - Check JOB status
 - Create JOB
 - Delete JOB
 - Create JOB Queue
 - Delete JOB Queue
- Get Logs
 - Export LC logs
 - Export System Event Logs

Ansible module for iDRAC

- Manage your entire Dell EMC IT infrastructure (servers, routers, switches, storage) from your Ansible Controller.
- Automated monitoring, provisioning, firmware updates at scale.
- Open source, so you can write your own extensions as needed and contribute back to the community.
- Working with Red Hat to include as core Ansible module.

Implementation (playbook)

```
---
- hosts: myhosts
  name: PowerEdge iDRAC
  gather_facts: False

  # Here we define global variables, but if some servers have different
  # credentials, then place these variables in /etc/ansible/hosts to override
  # for each host
  vars:
    idracuser: root
    idracpswd: calvin

  # Choices available:
  # Health          Get server health
  # Model           Get server model
  # BiosVersion     Get BIOS version
  # AssetTag        Get asset tag
  # Memory          Get system memory (GB)
  # CPU             Get CPU model
  # PowerRead       Get power consumed (watts)
  # Selog           Get SELogs

  tasks:

  - include: get_data.yml action={{item}}
    vars:
      json_file: /root/{{host}}-{{action}}
    with_items:
      - Health
      - Model
      - BiosVersion
      - AssetTag
      - Memory
      - CPU
      - PowerRead
      - Selog
```

idrac.yml



getdata.yml

```
---

- name: "Get data: {{ action }}"
  local_action: >
    idrac choice={{ action }} idracuser={{ idracuser }}
    idracpswd={{ idracpswd }} idracip={{ idracip }}
  register: result

- name: Print inventory file
  local_action: copy content={{ result | to_nice_json }}
  dest={{ json_file }}

# Using simple JSON parser jq (https://stedolan.github.io/jq/) to further
# simplify output. Uncomment once you have it installed.
- local_action: shell jq .result {{ json_file }} > {{ json_file }}.final
- local_action: file path={{ json_file }} state=absent
```



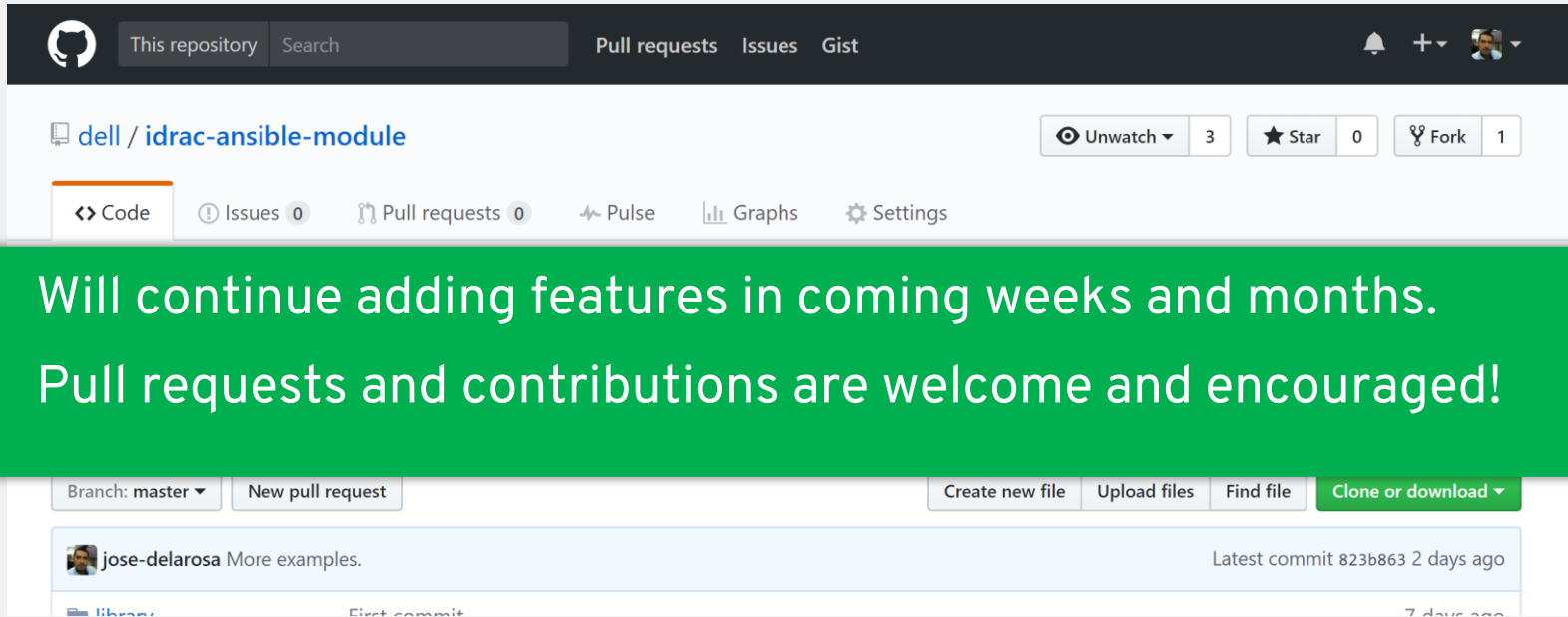
Server inventory

Use case: collect inventory data, maintain in spreadsheet or database

Server	iDRAC IP	Model	IP address	BIOS	CPU	Type	RAM	Service Tag	Status
webserver-1	192.168.2.10	PowerEdge R630	10.0.1.30	2.3.4	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz	128	5WT4Q47	OK
webserver-2	192.168.2.11	PowerEdge R630	10.0.1.31	2.3.4	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz	128	5XR7Q32	OK
webserver-3	192.168.2.12	PowerEdge R630	10.0.1.33	2.3.2	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.40GHz	128	5XR7QYY	OK
appserver-1	192.168.2.13	PowerEdge R830	10.0.1.34	2.3.2	4	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.60GHz	512	5XR7QYY	OK
dbserver-1	192.168.3.10	PowerEdge R730	10.0.2.30	2.1.2	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.33GHz	256	5XR7Q67	OK
dbserver-2	192.168.3.11	PowerEdge R730	10.0.2.31	2.3.4	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.33GHz	256	5WT4Q37	OK
dbserver-3	192.168.3.12	PowerEdge R730	10.0.2.32	2.3.4	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.33GHz	256	5WR4Q12	OK
dbserver-4	192.168.3.13	PowerEdge R730	10.0.2.33	2.3.4	2	Intel(R) Xeon(R) CPU E5-2630 v3 @ 2.33GHz	256	5TT1Q44	OK

Source code repository

- <https://github.com/dell/idrac-ansible-module>



Will continue adding features in coming weeks and months.
Pull requests and contributions are welcome and encouraged!

Resources

- iDRAC with Lifecycle Controller: <http://dell.to/2qdBd0y>
- Redfish API specification: <https://www.dmtf.org/standards/redfish>
- Dell EMC PowerEdge Redfish API Overview: <http://dell.to/2odsH1p>
- iDRAC Redfish API Reference Guide: <http://dell.to/2oyjMTy>
- Getting started with Ansible:
http://docs.ansible.com/ansible/intro_getting_started.html

Q & A

Backup

iDRAC operation APIs

Dell Redfish API URLs	Comments
/redfish/v1/Managers	
/redfish/v1/Managers/iDRAC.Embedded.1	
/redfish/v1/Managers/iDRAC.Embedded.1/Actions/Manager.Reset	Used to perform iDRAC reset
/redfish/v1/Managers/iDRAC.Embedded.1/NetworkProtocol	Reports information about iDRAC's network services. Includes Web server, SNMP, vMedia, Telnet, SSH, IPMI & KVM.
/redfish/v1/Managers/iDRAC.Embedded.1/SerialInterfaces	iDRAC BMC serial interface
/redfish/v1/Managers/iDRAC.Embedded.1/SerialInterfaces/<Serial-key>	
/redfish/v1/Managers/iDRAC.Embedded.1/LogServices	
/redfish/v1/Managers/iDRAC.Embedded.1/LogServices/Sel	Access to server System Event Log
/redfish/v1/Managers/iDRAC.Embedded.1/LogServices/Lclog	Access to Lifecycle Controller Log
/redfish/v1/Managers/iDRAC.Embedded.1/LogServices/Sel/Actions/LogService.ClearLog	Used to clear LC Log
/redfish/v1/Managers/iDRAC.Embedded.1/VirtualMedia	Status of iDRAC virtual media
/redfish/v1/Managers/iDRAC.Embedded.1/VirtualMedia/<media-type>	
/redfish/v1/Managers/iDRAC.Embedded.1/EthernetInterfaces	iDRAC network interface
/redfish/v1/Managers/iDRAC.Embedded.1/EthernetInterfaces/<FQDD>	
/redfish/v1/Managers/iDRAC.Embedded.1/AccountService	
/redfish/v1/Managers/iDRAC.Embedded.1/Accounts	iDRAC user accounts
/redfish/v1/Managers/iDRAC.Embedded.1/Accounts/<Account-Id>	

Chassis inventory APIs

Dell Redfish API URLs	Comments
/redfish/v1/Chassis	
/redfish/v1/Chassis/System.Embedded.1	Top-level URI for server chassis
/redfish/v1/Chassis/System.Embedded.1/Thermal	
/redfish/v1/Chassis/System.Embedded.1/Sensors/Fans	Reports fan status for server and FX2 chassis
/redfish/v1/Chassis/System.Embedded.1/Sensors/Fans/<Fan-FQDD>	
/redfish/v1/Chassis/System.Embedded.1/Sensors/Temperatures	Reports thermal data for server and FX2 chassis
/redfish/v1/Chassis/System.Embedded.1/Sensors/Temperatures/<Sensor-FQDD>	<Sensor-FQDD> addresses each temperature probe
/redfish/v1/Chassis/System.Embedded.1/Power	Power consumption and supply status
/redfish/v1/Chassis/System.Embedded.1/Power/PowerControl	
/redfish/v1/Chassis/System.Embedded.1/Sensors/Voltages	
/redfish/v1/Chassis/System.Embedded.1/Sensors/Voltages/<Voltage-FQDD>	<Voltage-FQDD> addresses each voltage output
/redfish/v1/Chassis/System.Embedded.1/Power/PowerSupplies	
/redfish/v1/Chassis/System.Embedded.1/Power/PowerSupplies/<PSU-FQDD>	<PSU-FQDD> addresses each power supply
/redfish/v1/Chassis/System.Embedded.1/Power/Redundancy/<PSRedundancy-FQDD>	<PSRedundancy-FQDD> addresses power supply redundancy

System status APIs

Dell Redfish API URLs	Comments
/redfish/v1	Top-level API access
/redfish/v1/Systems	Server inventory and status information access
/redfish/v1/Systems/<ServiceTag+nodeid>	
/redfish/v1/Systems/System.Embedded.1/Actions/ComputerSystem.Reset	Server reset operation
/redfish/v1/Systems/System.Embedded.1/Processors	Details on CPUs
/redfish/v1/Systems/System.Embedded.1/Processors/<Processor-FQDD>	
/redfish/v1/Systems/System.Embedded.1/EthernetInterfaces	Reports NIC IP address, DHCP and DNS information. Example <EthernetInterface-FQDD> = NIC.Embedded.1-1-1
/redfish/v1/Systems/System.Embedded.1/EthernetInterfaces/<EthernetInterface-FQDD>	
/redfish/v1/Systems/System.Embedded.1/EthernetInterfaces/<EthernetInterface-FQDD>/Vlans	
/redfish/v1/Systems/System.Embedded.1/EthernetInterfaces/<EthernetInterface-FQDD>/Vlans/<Vlan-FQDD>	
/redfish/v1/Systems/System.Embedded.1/Storage/Controllers	
/redfish/v1/Systems/System.Embedded.1/Storage/Controllers/<Controller-FQDD>	Typical <Controller-FQDD>=RAID.Slot.N-1; describes details of controller, backplane, enclosure, attached drives

Registries, Sessions, Tasks and Event APIs

Dell Redfish API URLs	Comments
/redfish/v1/Registries/Messages/En	PowerEdge message registry
/redfish/v1/odata	Enables OData clients to navigate iDRAC Redfish resources
/redfish/v1/\$metadata	Provides a metadata document describing the resources and collections that are available at the iDRAC Redfish service root URI
/redfish/v1/\$metadata#<Collection or a single resource>	
/redfish/v1/JSONSchemas	Schema descriptions for all supplied data
/redfish/v1/JSONSchemas/<file>	
/redfish/v1/SessionService	Redfish session management
/redfish/v1/Sessions	
/redfish/v1/Sessions/<SessionId>	
/redfish/v1/TaskService	Redfish internal task management
/redfish/v1/EventService	Redfish event management
/redfish/v1/EventService/Actions/EventService.SubmitTestEvent	
/redfish/v1/EventSubscriptions	
/redfish/v1/EventSubscriptions/<Subscription ID>	

RED HAT
SUMMIT

THANK YOU



plus.google.com/+RedHat



facebook.com/redhatinc



linkedin.com/company/red-hat



twitter.com/RedHatNews



youtube.com/user/RedHatVideos

The logo consists of a red speech bubble shape pointing downwards, containing the text "RED HAT" in a smaller font above "SUMMIT" in a larger font, both in white.

RED HAT
SUMMIT

**LEARN. NETWORK.
EXPERIENCE
OPEN SOURCE.**