Introduction to Redfish

DMTF Scalable Platforms Management Forum
May 2016
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What is Redfish?

- **Industry Standard RESTful API for IT Infrastructure**
  - HTTPS in JSON format based on Odata v4
  - Equally usable by Apps, GUIs and Scripts
  - Schema-backed but human-readable

- **Version 1 focused on Servers**
  - A secure, multi-node capable replacement for IPMI-over-LAN
  - Add devices over time to cover customer use cases & technology
    - PCIe Switching, Local Storage, NVDIMMs, Multifunction Adapters, Composability
  - Intended to meet OCP Remote Machine Management requirements

- **Expand scope over time to rest of IT infrastructure**
  - Working with SNIA to cover more advanced storage.
  - Plan on working with partners like the Green Grid to cover Power/Cooling.
  - Goal is to accommodate or map existing switch standards over time.

[www.dmtf.org](http://www.dmtf.org)
Scalable Platforms Management Forum
(DMTF Group that Defines Redfish)

Co-Chairs: Jeff Autor (HPE), Paul Vancil (Dell)

Leadership Companies

Supporting Companies
AMI, Cisco, Fujitsu, Western Digital, Huawei, IBM, Insyde Software, Mellanox, NetApp, Oracle, Microsemi, Qualcomm, Seagate

Industry Alliance Partners
• OpenCompute Project
• UEFI - Collaborating on Firmware Update and Host Interface work
• SNIA – Collaborating on Storage modeling/alignment between SSM and Redfish
• TGG – Pursuing relationship to work on Power/Cooling (existing DMTF Alliance Partner)

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Why REST, HTTP and JSON?

- **REST**: The API architecture
  - Rapidly replacing SOAP
- **HTTPS**: The Web protocol
  - Well-understood by admins
  - Known security model
  - Known network configuration
- **JSON**: Modern data format
  - Human-readable
  - Simpler than XML
  - Modern language support

- The combination of language support and ubiquity of REST, HTTP and JSON means that systems management tasks can be performed using the same skill set and tool chain as all other IT and dev/ops tasks.
How simple is REST using JSON?

Example Python code to retrieve serial number from a server:

```python
rawData = urllib.urlopen('http://192.168.1.135/redfish/v1/Systems/1')
jsonData = json.loads(rawData)
print(jsonData['SerialNumber'])
```

Output is:

```
1A87CA442K
```

*Example uses Redfish ComputerSystem resource, Authentication not shown*
## Redfish v1.0 Feature Set

<table>
<thead>
<tr>
<th><strong>Retrieve “IPMI class” data</strong></th>
<th><strong>Perform Common Actions</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>• Basic server identification and asset info</td>
<td>• Reboot/power cycle server</td>
</tr>
<tr>
<td>• Health state</td>
<td>• Change boot order/device</td>
</tr>
<tr>
<td>• Temperature sensors and fans</td>
<td>• Set power thresholds</td>
</tr>
<tr>
<td>• Power supply, power consumption and thresholds</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Basic I/O infrastructure data</strong></th>
<th><strong>Access and Notification</strong></th>
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</thead>
<tbody>
<tr>
<td>• Host NIC MAC address(es) for LOM devices</td>
<td>• Serial console access via SSH</td>
</tr>
<tr>
<td>• Simple hard drive status/fault reporting</td>
<td>• Alert/event notification method(s)</td>
</tr>
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<tr>
<th><strong>Discovery</strong></th>
<th><strong>BMC infrastructure</strong></th>
</tr>
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<tbody>
<tr>
<td>• Service endpoint (network-based discovery)</td>
<td>• View/configure BMC network settings</td>
</tr>
<tr>
<td>• System topology (rack/chassis/server/node)</td>
<td>• Manage local BMC user accounts</td>
</tr>
</tbody>
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<thead>
<tr>
<th><strong>Security</strong></th>
<th><strong>Working on more…</strong></th>
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<tr>
<td>• Session-based leverages HTTPS</td>
<td></td>
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Redfish releases

• v1.0 Released August 2015
  • Specification and Schema files
• v1.1 Release November 2015
  • Spec 1.0.1, Schema 1.1, 1.0.1 and 1.0
• 2016.1 Release April, 2016
  • Spec 1.0.2, Schema 1.2, 1.1, 1.0.2 and 1.0
• Releases planned for Schema and Specification
  • 2016.2 - Summer 2016 (August)
  • 2016.3 - Fall 2016 (December)
• Expecting 3 releases per year.
  • Each release will have updates, errata and additions that are ready at that time
• Download specification, white paper, FAQ, schemas, Works in Progress:
  • http://www.dmtf.org/standards/redfish
Redfish 2016 Release 1

- Redfish Specification v1.0.2 (errata)
- **NEW** Schemas v1.0.0
  - AttributeRegistry, Bios, Drive, Memory, MemoryCollection, MemoryMetrics, SecureBoot, Storage, StorageCollection, Volume
- Schemas v1.1.0 or v1.2.0 (minor revs)
  - Chassis, ComputerSystem, Event, Manager, Power, Resource, SimpleStorage, Thermal
- Schemas v1.x.2 (errata)

Schema Release Bundles (posted at http://www.dmtf.org/standards/redfish)

DSP8010_2016.1: All new, minor, and errata 2016.1 schemas
Individual file contents also posted on http://redfish.dmtf.org/schemas

DSP8010_2016.0.9a: Work in Progress
New schemas under development within SPMF
Expected Redfish Open Source Efforts

**Conformance Tool**

**Client Library**
- Common utility support functions
  - Discovery, Enumeration, etc.
  - Event subscription
- Typical tasks
  - Power on/off/reboot
  - Gather thermal data
- Languages under consideration
  - Python
  - Java
  - PowerShell
  - Other possibilities…

**Command Line Utility**
- Similar to IPMItool
- Designed for end users
- Calls Client library
- Likely written in Python

**Conformance Test Suite**
- Schema validation (JSON and CSDL)
- Payload validation
- Spec and Schema conformance
- Checklist for vendors and customers
- Avoid spec interpretation conflicts
Introduction to the Redfish data model

- All resources linked from a Service Entry point (root)
  - Always located at URL: /redfish/v1
- Major resource types structured in ‘collections’ to allow for standalone, multi-node, or aggregated rack-level systems
  - Additional related resources fan out from members within these collections
- **ComputerSystem**: properties expected from an OS console
  - Items needed to run the “computer”
  - Roughly a logical view of a computer system as seen from the OS
- **Chassis**: properties needed to locate the unit with your hands
  - Items needed to identify, install or service the “computer”
  - Roughly a physical view of a computer system as seen by a human
- **Managers**: properties needed to perform administrative functions
  - aka: the systems management subsystem (BMC)
Resource map (highlights)

/redfish/v1
Root Resource
Links to all content

/redfish/v1/Systems
Collection of Systems
“Logical” view of the system

/redfish/v1/Systems/<id>
Server Information
Model #, Serial #, Boot Order, NIC MAC, status, etc.

/redfish/v1/Chassis
Collection of Chassis
“Physical” view of the system

/redfish/v1/Chassis/<id>
Chassis
Chassis global physical asset info

/redfish/v1/Managers
Collection of Managers
BMC functionality

/redfish/v1/Managers/<id>
BMC
System Manager operations

Session
Accounts
Schema
Events

Processors
Disks
NICs
Power
Thermal
Services
Logs

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More on Redfish:

- **Join the SPMF**
  - Help shape the standard
  - [http://www.dmtf.org/join/spmf](http://www.dmtf.org/join/spmf)
- **We want your Feedback**
  - On the Standard or Works in Progress
  - [http://www.dmtf.org/standards/feedback](http://www.dmtf.org/standards/feedback)
- **Redfish Standards**
  - Schemas, Specs, Mockups, White Papers, FAQ, Educational Material & more
  - [http://www.dmtf.org/standards/redfish](http://www.dmtf.org/standards/redfish)
- **Redfish Developer Portal**
  - Redfish Interactive Explorer, Hosted Schema at Namespace & other links
  - [http://redfish.dmtf.org](http://redfish.dmtf.org)
- **SPMF (Working Group that defines Redfish)**
  - Companies involved, upcoming schedules & future work, charter, information on joining.
  - [http://www.dmtf.org/standards/spmf](http://www.dmtf.org/standards/spmf)