

Redfish

The new standard for a Software Defined Infrastructure

Introducing myself

- Software engineering and Unices since 1988:
 - Mostly Configuration Management Systems (CMS), Build systems, quality tools, on multiple commercial Unix systems
 - Discovered Open Source & Linux (OSL) & made first contributions in 1993
 - Full time on OSL since 1995
- Currently:
 - OSL Technology **Strategist** , Grenoble, France
 - FLOSSITA **board chair**
 - POSS conference, OpenStack.fr, AFUL **previous board member**.
 - Conferences at WW level at LinuxCon, Linux.conf.au, Fosdem, ...
 - MondoRescue, Project-Builder.org, python-redfish, UUWL and PUSK **Project Lead**
 - LinuxCOE, mrepo, tellico, rinse, fossology, collectl, Ironic **contributor**
 - FOSSBazaar/SPDX and OSL **Governance** enthusiast
 - Mandriva, Mageia **packager**
- And also:
 - Amateur singer (Alto / Tenor), recorder player since 1976 and Choir **director** since 1987, CD collector (6000+), Concerts, Photography





Some definitions

What is REST?

REST- REpresentational State Transfer

- Modern and easy to adopt Software Architectural Style for Web services
- Scalable, Stateless, Performant, Reliable
- Standardized HTTP operations (verbs)
 - GET, POST, PUT, and DELETE
 - Practical implementations also add PATCH, HEAD

See: https://en.wikipedia.org/wiki/Representational_state_transfer



What is API?

API – Application Programming Interface

- API is an interface between different software components invoked over communication networks using standards based technologies.
- Used to power orchestration, apps/tools integration.
- Exist at Firmware or OS level, software libraries, DBs, Web based system,
- Examples include POSIX, X-Window, OpenStack (RESTful)

See: https://en.wikipedia.org/wiki/Application_programming_interface



What is JSON?

JSON- Java Script Object Notation

- Open Standard data-serialization format based on key/value pairs
- Language independant (originated from Javascript)
- Easy for machines to parse and generate with large langage support (C, perl, python, java, ...)
- Easy for humans to read and edit
- Used to import/export data structures
- Similar standards : YAML, XML

See : <https://en.wikipedia.org/wiki/JSON>



```
{
  "firstName": "John",
  "lastName": "Smith",
  "isAlive": true,
  "age": 27,
  "address": {
    "streetAddress": "21 2nd Street",
    "city": "New York",
    "state": "NY",
    "postalCode": "10021-3100"
  },
  "phoneNumbers": [
    {
      "type": "home",
      "number": "212 555-1234"
    },
    {
      "type": "office",
      "number": "646 555-4567"
    },
    {
      "type": "mobile",
      "number": "123 456-7890"
    }
  ],
  "children": [],
  "spouse": null
}
```

What is OData?

OData-

- Open protocol to enable creation and consumption of REST APIs
- Provides Service and Metadata Document, Dynamic Resources
- Uses Resource Operation, which are standardized HTTP operations (verbs)
 - GET, POST, PUT, PATCH and DELETE

See : https://en.wikipedia.org/wiki/Open_Data_Protocol

See also : <http://docs.servicestack.net/why-not-odata>

```
{
  "@odata.context": "http://services.odata.org/V4/OData/OData.svc/$metadata#Products",
  "value": [
    {
      "ID": 0,
      "Name": "Meat",
      "Description": "Red Meat",
      "ReleaseDate": "1992-01-01T00:00:00Z",
      "DiscontinuedDate": null,
      "Rating": 14,
      "Price": 2.5
    },
    {
      "ID": 1,
      "Name": "Milk",
      "Description": "Low fat milk",
      "ReleaseDate": "1995-10-01T00:00:00Z",
      "DiscontinuedDate": null,
      "Rating": 3,
      "Price": 3.5
    },
    ...
  ]
}
```



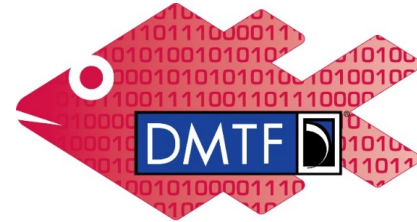


Redfish: What ? Why ? How ?

What is Redfish?

Redfish

- Open industry standard specification and schema
 - First really interoperable management interface cross-vendors (vs SMASH)
 - Built upon giant shoulders (http(s) RESTful API using JSON and OData)
 - Better HW support (vs IPMI) (chassis, multi-node platforms)
 - Supports private extensions (like SNMP) in an Oem schema
- See : <https://en.wikipedia.org/wiki/Redfish> (doesn't exist yet, but being proposed!)

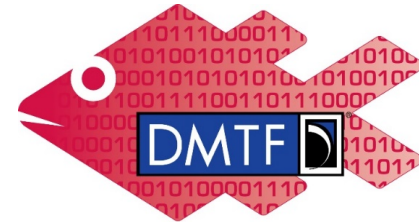
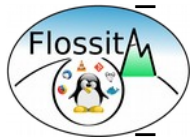


Redfish



Redfish Timeline

- DMTF published Redfish 1.0 the 4th of August 2015
 - JSON/Odata based schemas to describe resources
 - Mockup to allow developers to test wrt Redfish
 - Documentation, white papers, FAQ
 - Available online at <https://www.dmtf.org/standards/redfish>
 - Last version is now 2018.3 (2019-01-11)
- Available in:
 - DELL iDRAC BMC with Minimum iDRAC 7/8 FW 2.40.40.40, iDRAC9 FW 3.00.00.0
 - HPE iLO BMC with minimum iLO4 FW 2.30, iLO5
 - HPE Moonshot BMC with minimum FW 1.41
 - Supermicro X10 BMC with minimum FW 3.0 and X11 with minimum FW 1.0
 - Insyde Software Supervyse[4] BMC



Redfish

Founding members

Hewlett Packard Enterprise

EMERSON

intel

DELL EMC²

Additional sponsors

SEAGATE BROADCOM American Megatrends Mellanox TECHNOLOGIES

HUAWEI SUPERMICR lenovo FUJITSU COMPUTERS SIEMENS

ERICSSON ORACLE vmware Microsoft inspur CISCO

Redfish Feature set

Collect “IPMI class” server data

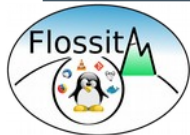
- Status of **server health**
- **Temperature** sensors and **fans**
- Server **identification**
- Inventory **CPUs, memory** and **MAC address**
- **400** items (100 setable)

Perform common actions

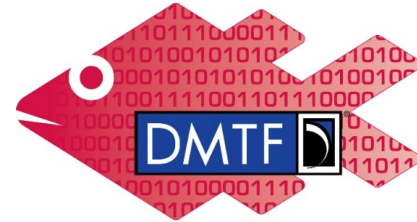
- **Power cycle** and **reboot** server
- Change **boot order**
- Set **power thresholds**
- **Alert** notifications
- Access **Event log** and **SSH Serial console**
- Basic **OS** information

Manage server infrastructure

- View / configure BMC **network settings**
- Manage local BMC **user accounts**



Redfish toolset

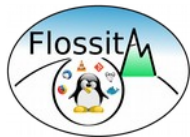
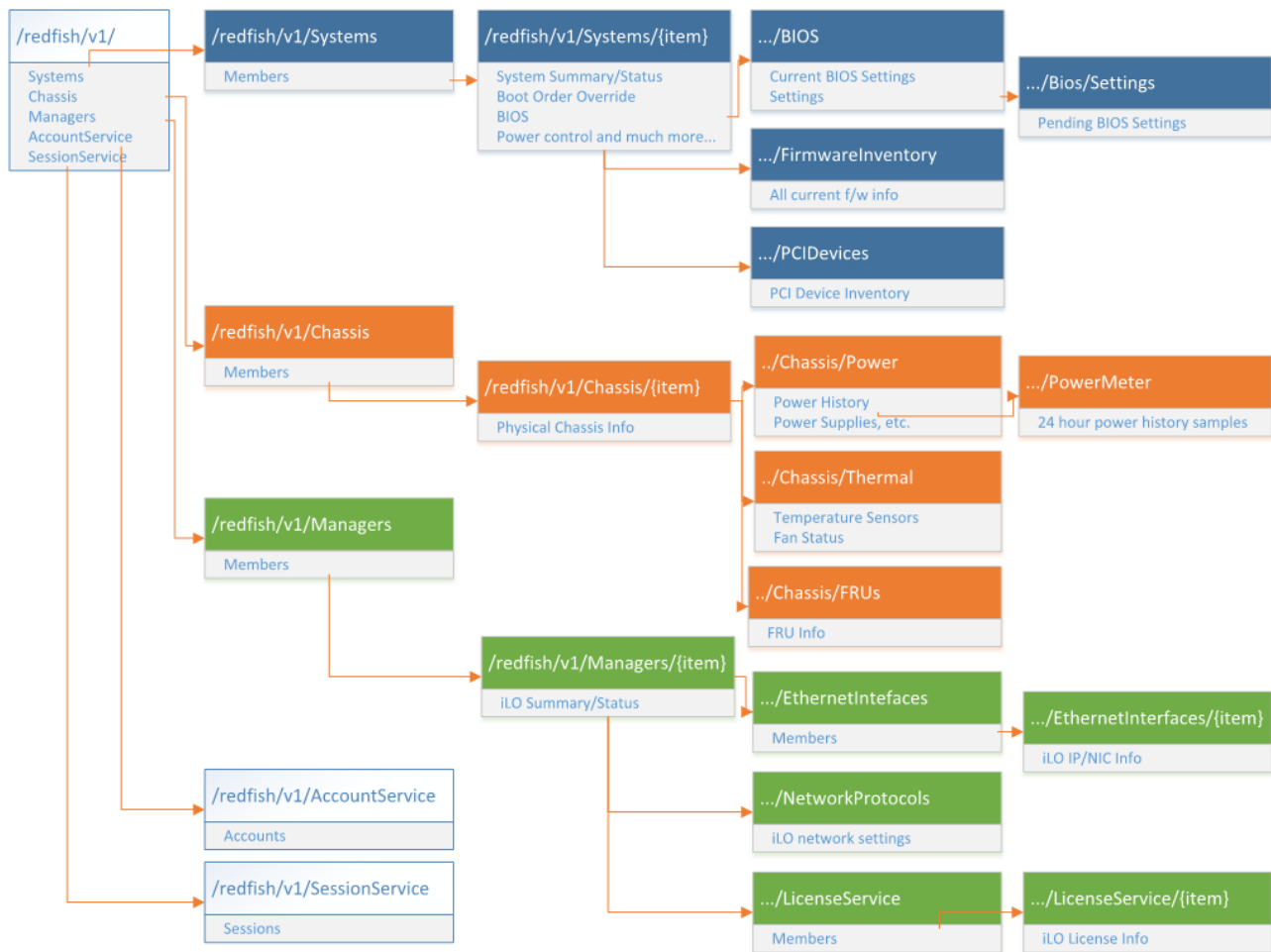


Redfish

- DMTF provides many tools :
 - <https://redfish.dmtf.org/> Redfish developer Hub (mockup, docs, tools)
 - <https://github.com/DMTF> Bindings (C, python,), CLI tools, Simulators, Validators
- <https://git.openstack.org/cgit/openstack/python-redfish> python-redfish library
- <https://git.openstack.org/cgit/openstack/sushy> python library used by Ironic
- OpenStack Ironic bare metal deployment project has a Redfish driver
<https://docs.openstack.org/ironic/latest/admin/drivers/redfish.html>



Data Model



Redfish Demo

<https://redfish.dmtf.org/redfish/v1>



python-redfish description



- A python library to manage Redfish compliant systems
 - Open Source project under the Apache License v2.0
 - Initiated the 25th March 2015 during the 7th HPE TES in Grenoble.
 - Now an OpenStack project
 - Available at:
 - <https://github.com/openstack/python-redfish>
 - Discussions on python-redfish@mondorescue.org
 - Bugs at <https://launchpad.net/python-redfish>
 - Python dependencies: python-requests, python-tortilla, python-futures, python-json, python-urllib, python-simplejson, ...
 - Packages available at ftp://ftp.mondorescue.org/centos/7/x86_64 and ftp://ftp.mondorescue.org/fedora/23/x86_64
- Easy integration of Redfish support into python based applications
- Potential consumers: a Redfish client tool based on that library (preliminary work done as part of the project), scripts for Lab setup, Alexandria (CMDB as a Service), Future usages with cobbler, anaconda, ...



Kick-off at TES 2015 (left to right): Bruno Cornec, Samer El-Haj Mahmoud, Devananda van der Veen, Scott Hinchley, René Ribaud, Vincent Misson (not on screen)



python-redfish Status & Roadmap

- Status:

- Project at v0.4.1 – Usable for PoC
- Core library ready:
 - Bios info,
 - Power management
 - Demos scripts available
- Client tool
- Docker file for testing with DMTF mockup container
- Tests performed with:
 - DMTF mockup (0.95 & 1.0)
 - iLO4 and iLO5 based ProLiant servers (0.95 & 1.0)
 - Moonshot chassis Managers (0.95)
 - iLO4 based Moonshot cartridges m510 (1.0)
- Python dependencies already available in Mageia and Fedora, CentOS 7 on our ftp server. Debian TBD (contribs welcome !)
- Packages built with project-builder.org (rpm, deb to come)

```
import redfish
remote_mgmt = redfish.connect(URL, USER_NAME, PASSWORD, verify_cert=False)
remote_mgmt.get_api_version()
remote_mgmt.Systems.systems_list[0].get_power()
remote_mgmt.Systems.systems_list[0].bios.get_parameter("AdminPhone")
remote_mgmt.Systems.systems_list[0].bios.set_parameter("AdminPhone", "xxx")
remote_mgmt.Systems.systems_list[0].reset_system()
```

- Roadmap:

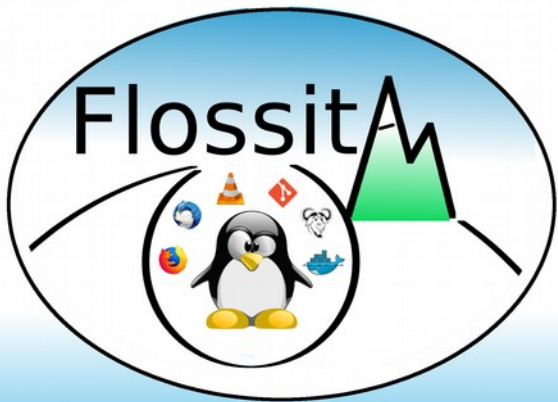
- Fix reported enhancement requests
- Work on Alexandria needed interfaces (inventory)



Python-Redfish Demo

<https://ilorestfulapiexplorer.ext.hpe.com/>





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THANK YOU

Linus Torvalds, Richard Stallman, Eric Raymond, Nat Makarevitch, René Cougnenc, Eric Dumas, Rémy Card, Bdale Garbee, Solomon Hykes, Bryan Gartner, Andree Leidenfrost, Phil Robb, Bob Gobeille, Martin Michlmayr among others, for their work and devotion to the Open Source Software cause... and my family for their patience :-)