Hewlett Packard Enterprise

HPE REST(Redfish) Integration

Martin Papik

A REST example

- Remote controls make good examples
- The “Power” button is usually a toggle:
  - Press once and it turns the TV on
  - Press again and it turns the TV off
- But the “Channel” buttons are RESTful
  - Press “2” and it tunes to channel 2
  - Press “2” again and it remains on channel 2
- The toggle style buttons fail horribly when used in “macro” programming…
  - Good devices actually provide three buttons (or at least the IR codes)
  - “Power On”, “Power Off” and “Power Toggle”
  - Toggles are good for humans, bad for software

REpresentational **S**tate **T**ransfer

Thesis written in 2000 by Roy Fielding

Why call it “Redfish”?

– Public answer: “*It was the codename, which survived as the final name for the standard…*”

……But there’s more to that story…

– “Redfish” is a reference to the (good!) seafood restaurant near the HPE Houston

What is the Redfish API- DMTF Standard?

- **Industry Standard RESTful API for IT Infrastructure Management**
- **Led by HPE**, and released as a specification through the DMTF and backed by wide industry support
- HPE is the founder and co-chair of the Redfish working group
- **HPE iLO 4,5,6 are Redfish API compliant**

Developers: Please Visit the Redfish Developer Hub!

DMTF's Redfish Developer Hub is a one-stop, in-depth technical resource – by developers, for developers – designed to provide all the files, tools, community support, tutorials and other advanced education you may need to help you use Redfish.

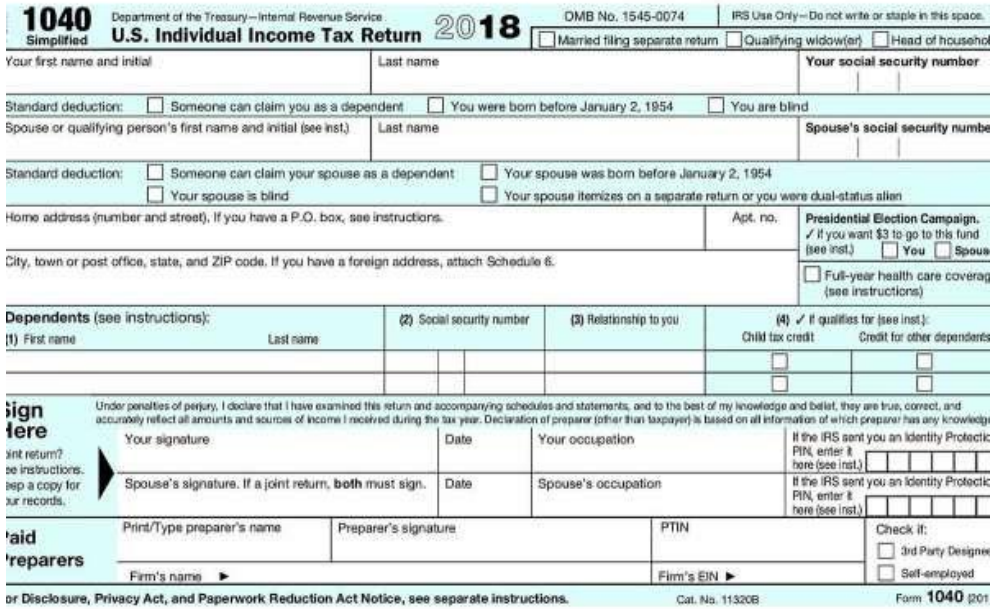
Redfish Release

DSP #	Version	Title	Date	Comments	Versions
DSP0266	1.17.0	Redfish Specification	23 Jan 2023	Standard	View
DSP0268	2022.3	Redfish Data Model Specification	23 Jan 2023	Standard	View

https://www.dmtf.org/standards/redfish

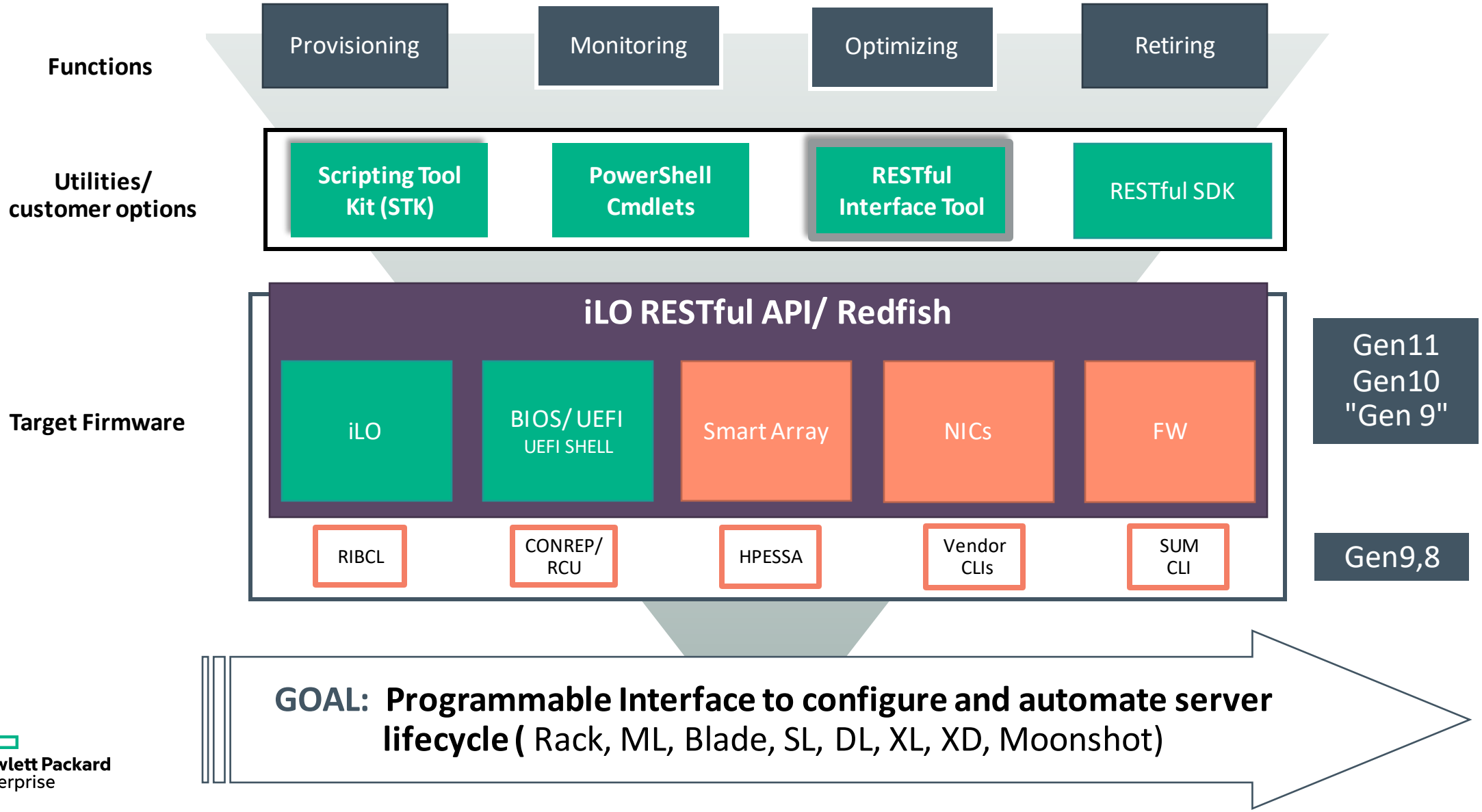
What is a “schema” vs. “payload”

- A schema describes data
  - Description: What does the value mean
  - Name: What do we call this value (property) - the “key”
  - Format: Text string, number, boolean (true/false), etc.
  - Additional characteristics: length, range (min/max), etc.
- A payload is an instance of a schema
  - For Redfish, a JSON formatted “document” or “resource”
  - Contains one or more **“key”: value** pairs


1040 Simplified Department of the Treasury—Internal Revenue Service U.S. Individual Income Tax Return 2018 DMB No. 1545-0074 IRS Use Only—Do not write or staple in this space.
Married filing separate return Qualifying widow(er) Head of househol
Your first name and initial Last name Your social security number
Standard deduction: Someone can claim you as a dependent You were born before January 2, 1954 You are blind
Spouse or qualifying person's first name and initial (see inst.) Last name Spouse's social security numbe
Standard deduction: Someone can claim your spouse as a dependent Your spouse was born before January 2, 1954
Your spouse is blind Your spouse itemizes on a separate return or you were dual-status alien
Home address (number and street). If you have a P.O. box, see instructions. Apt. no. Presidential Election Campaign. ✓ if you want $3 to go to this fund (see inst.) You Spous
City, town or post office, state, and ZIP code. If you have a foreign address, attach Schedule 6. Full-year health care coverag (see instructions)
Dependents (see instructions): (1) First name Last name (2) Social security number (3) Relationship to you (4) ✓ if qualifies for (see inst.): Child tax credit Credit for other dependents
Sign here Under penalties of perjury, I declare that I have examined this return and accompanying schedules and statements, and to the best of my knowledge and belief, they are true, correct, and accurately reflect all amounts and sources of income I received during the tax year. Declaration of preparer (other than taxpayer) is based on all information of which preparer has any knowledg
Your signature Date Your occupation If the IRS sent you an Identity Protectio PIN, enter it here (see inst.)
Spouse's signature. If a joint return, both must sign. Date Spouse's occupation If the IRS sent you an Identity Protectio PIN, enter it here (see inst.)
Paid Preparers Print/Type preparer's name Preparer's signature PTIN Check if: 3rd Party Designee Self-employed
Firm's name ► Firm's EIN ►
or Disclosure, Privacy Act, and Paperwork Reduction Act Notice, see separate instructions. Cat. No. 11320B Form 1040 (201

```
{
“firstName": “Jeff",
“lastName”: “Newman”,
“income”: 549838534.37,
“onePercent”: true,
“taxesDue”: 42.19
}
```

Server Automation Portfolio



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Why iLO RESTful API & Redfish API are important?

The iLO RESTful API SDK Ecosystem

Explore the API →

GitHub Repositories

Find tools you need to help you leverage the iLO RESTful API SDK.

SDKs and Language Bindings

- iLO RESTful API Documentation helps you explore the data model, download sample code, use HTTP Basic Authentication and more.
- The Python library provides a rich Python library for developers to easy interact with the iLO RESTful API.
- The PowerShell library provides comments to interact with Windows PowerShell Interface to the iLO RESTful API.
- The Ruby library enables to interact the iLO RESTful API.
- The JavaScript library enables Java developers to easily integrate with the iLO RESTful API.

DevOps

- Chef Cookbook for installing the Python iLOrest library and examples.
- Puppet module for installing the Python iLOrest library and examples.
- Ansible role for installing the Python iLOrest library and examples.

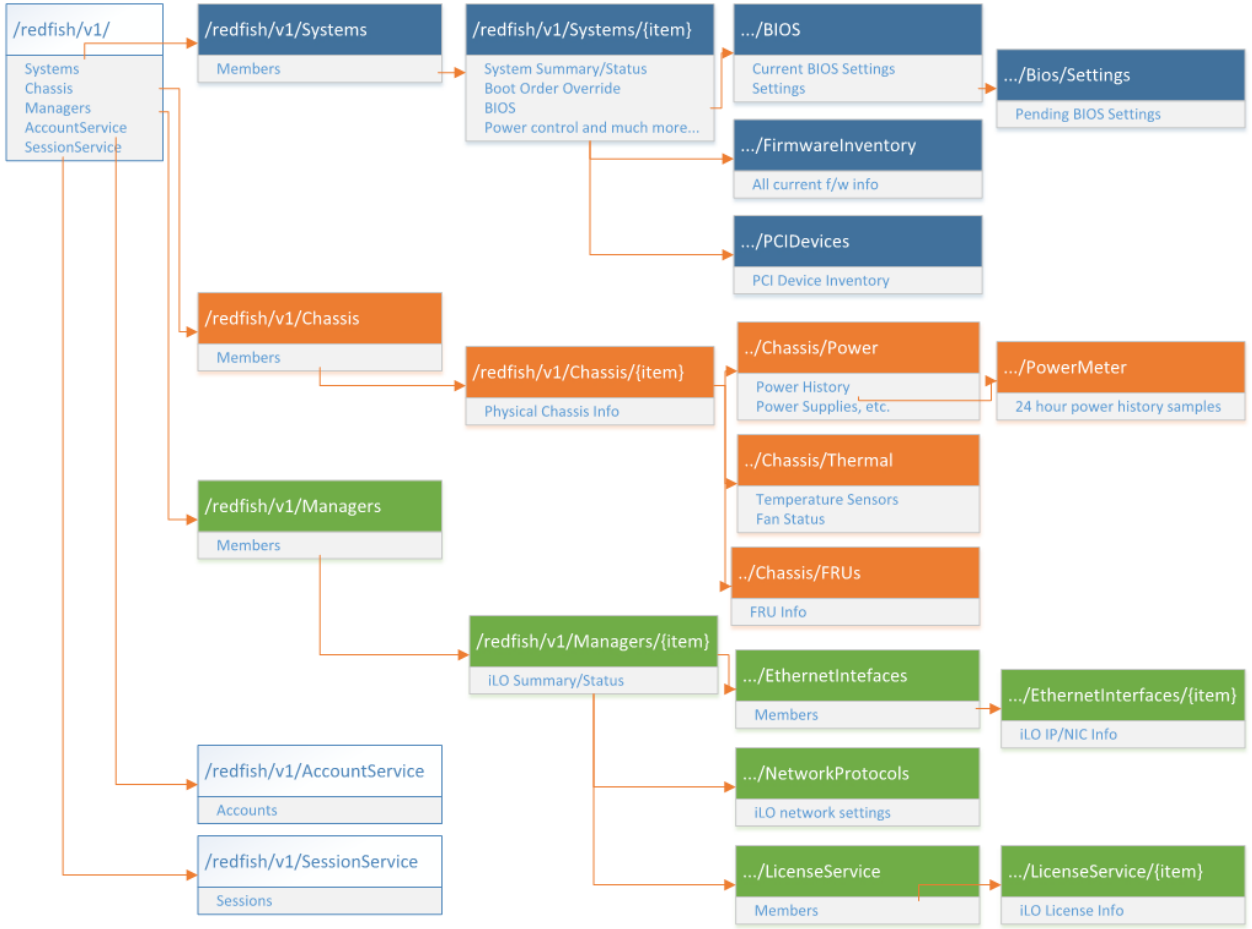
IT Operations

- RESTful Interface Tool is an open source scripting tool with devices supporting Redfish API.
- RESTful Interface Tool documentation.
- Nagios- Plug-in for Industry Standard in IT infrastructure monitoring.

https://www.hpe.com/us/en/servers/restful-api.html

- Key technical concepts - A “Resource” is a single JSON document retrieved from a URI

Model:



Operations:

- HTTP has 5 basic operations handle the bulk of the work:
  - GET – Retrieve a web page (aka a document or “resource” data payload)
  - PUT – Replace an entire resource
  - PATCH – Replace some data in a resource
  - POST – Create a new resource
  - DELETE – Delete a resource
- “URI / URL” – Uniform Resource Identifier / Locator
  - Essentially the full network address, path, and filename of a resource on the web

- All data is interchanged using JSON formatted UTF-8 data
- Data model is self-navigating

RESTful Interface Tool (iLOREST)

Overview

- **The RESTful Interface Tool** is a command line interface(CLI) tool
- Used to view or manipulate data from the iLO RESTful API & Redfish API for configuration or inventory
- Supported ProLiant servers Gen9,10,11 Servers
- Remote Capability – most of the current configuration tools only support local mode.

Severity	Type | Subtype	Title	Version ↓	Environment
	Utility | Tools	RESTful Interface Tool for Linux	4.1.0.0 2023-04-07	
	Utility | Tools	RESTful Interface Tool	4.1.0.0 2023-04-07	

www.hpe.com/info/resttool

RESTful Interface Tool
Hardware/OS Support

Hardware

– ProLiant Gen9, Gen10 servers – will not support Gen8(except DL580) or older servers.

– Operating systems:

  – Linux 64-bit – Rocky 8+, Centos/RedHat 6.x+, SLES 11+, Debian

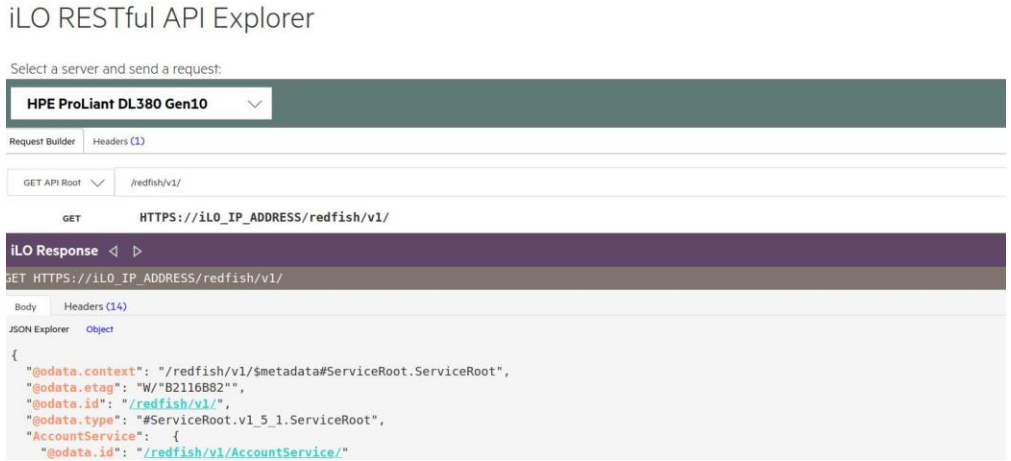
    – RPM package available for installation

    – Debian package available for installation

  – Windows x64 – Windows 2008 R2 SP1, Windows 2012, Windows 2012 R2, Windows Server 2016+

    – MSI package available for installation

– ILO rest explorer: https://ilorestfulapiexplorer.ext.hpe.com/



Demo – ilorest tool

DL360 Gen11

https://hewlettpackard.github.io/python-redfish-utility/#overview

https://github.com/HewlettPackard/python-redfish-utility/tree/master/examples/Linux

Demo 1 – basic login modes

-Login into server remotely (script mode):

ilorest login 192.168.100.101 -u admin -p iloadmin

ilorest types

ilorest select bios

ilorest list

ilorest exit

-Login into server remotely (interactive mode):

```
[root@hpc-dpl6 tmp]# ilorest
iLOrest : RESTful Interface Tool version 4.1.0.0
Copyright (c) 2014-2023 Hewlett Packard Enterprise Development LP
----------------------------------------------------------------
iLOrest > login 192.168.100.101 -u admin -p iloadmin
Discovering data...Done
iLOrest >
```

Demo 2 – info and set new server name

-Login into server remotely:

iLOrest > login 192.168.100.101 -u admin -p iloadmin

Discovering data...Done

iLOrest > serverinfo

iLOrest > types

iLOrest > select bios

iLOrest > list

iLOrest > get ServerName

iLOrest > set ServerName=demo2

iLOrest > commit

Demo 3 – power on/off, saving cfg and BIOS handling

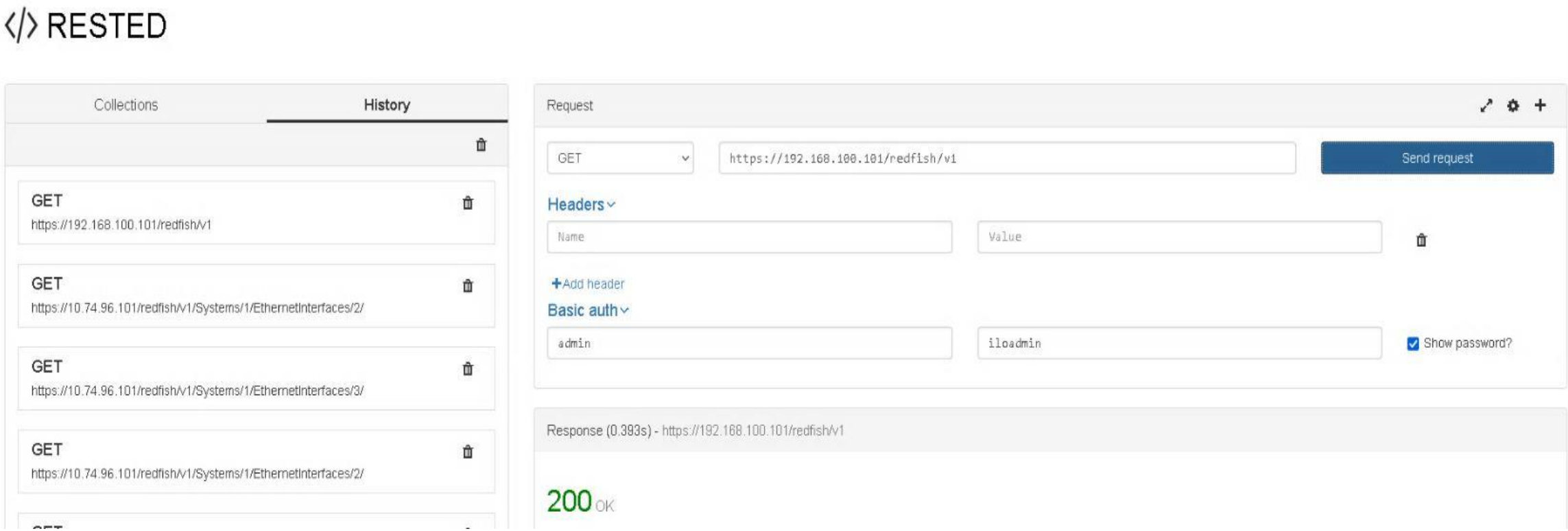
-Login into server remotely:

```
iLOrest > login 192.168.100.101 -u admin -p iloadmin
iLOrest > reboot PushPowerButton

iLOrest > backuprestore backup
iLOrest > backuprestore restore -f <filename.bak>

iLOrest > save --selector bios -f bios_demo2.json
iLOrest > load -f bios_demo2.json

iLOrest > reboot ForceOff
```

Demo – RESTED Firefox plugin

DL360 Gen11

Demo 1
RESTED Plugin



Demo – curl

DL360 Gen11

Demo 1 – create user account and set BIOS profile

```
curl -v -H "Content-Type: application/json" -X POST --data "@used_add.json"
https://192.168.100.101/redfish/v1/AccountService/Accounts/ -u Administrator:iloadmin –insecure
```

Json file content:

```
{"UserName":"user1","Password":"PASSW0RD","Oem":{"Hpe":{"LoginName":"user1","Privileges":{ "HostBIOSConfigPriv":
true,"HostNICConfigPriv": true,"HostStorageConfigPriv": true,"LoginPriv": true,"RemoteConsolePriv":
true,"SystemRecoveryConfigPriv": true,"UserConfigPriv": true,"VirtualMediaPriv": true,"VirtualPowerAndResetPriv":
true,"iLOConfigPriv": true}}}}
```

```
curl -v -H "Content-Type: application/json" -X PATCH --data "@bios_profile_hpc.json"
https://192.168.100.101/redfish/v1/Systems/1/bios/settings/ -u Administrator:iloadmin –insecure
```

Json file content:

```
{
    "Attributes": {
        "WorkloadProfile": "HighPerformanceCompute(HPC)"
    }
}
```

REST availability on other products

Storage and Aruba

API Discovery

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- HPE Storage
- HPE Alletra9K
- HPE Alletra6K
- HPE Alletra5K (future release)
- HPE Primera
- HPE 3PAR
- HPE Nimble
- Broadcom
- HPE InfoSight
- HPE DSCC

Settings

HPE Storage

This application can be used to demonstrate how HPE Storage Application Programming Interface (API) can be queried and how customers can benefit from using HPE Storage APIs for monitoring and managing their HPE Storage products and services. The puprpose of the app is to have be able to discover the value of the APIs for several HPE Storage products and HPE As a Service, wihtout having extensive knowledge of programming, programming languages and API architectures. Just basic understanding of the HPE Storage product or HPE As a Service (like credtials, API port, etc) is enough to be able to get some data (in JSON format) to have an idea what information can be retrieved.
This app is not intended, nor designed, to be a replacement for any of the HPE Storage management products and it cannot be used as an interface to any third party management tools. That is one of the reasons why the app only allows to run 'GET', so it will only retrieve data and cannot change the array configuration. That also eliminates (or at least reduces) the risk of running the app: it is read-only to the target platform.

Application Programming Interface (API). In a nutshell, an API makes it possible to interact with an application programmatically. This means that developers can integrate their application with your applications in a standardized way. This becomes very useful because it opens up a whole lot of new use cases and business opportunities. But in order for you to take advantage of these opportunities, you need to understand the product's API well enough so that you can discuss its capabilities with developers. This application removes the requirement to fully understand the product's API to demonstrate the API and its benefits.

There are several ways to use APIs, like: curl, Python, Postman and others, however these require (some) programming skills. This application does not require any program (language) skills. It can be run whith basic HPE Storage knowledge and basic HPE Storage API commands. the HPE Storage API commands are documented in the API developers guide, however for convenience the most common ones are listed while typing in the input box.

To pass data back and forth with an API, you need to make sure the client (calling the API) and the API agree on a format for this data. The most popular format nowadays is called JSON (for JavaScript Object Notation). JSON is a fairly readable machine language which typically looks like a series of Key/Value pairs separated with colons, with string values in quotes and multiple key/values separated with commas. This app will use JSON to retrieve the information from the API and will show the JSON output in a formatted way for easy reading.

If developers are interested in more details on HPE Storage APIs the HPE Developer portal blogs are a good starting point

HPE Developers Portal

HPE Developers Blog

DSCC specific help

Getting Started with the HPE Data Services Cloud Console Public REST API

Implementing OAuth 2 Flow for Data Services Cloud Console's Client Application

Data Services Cloud Console API documentation

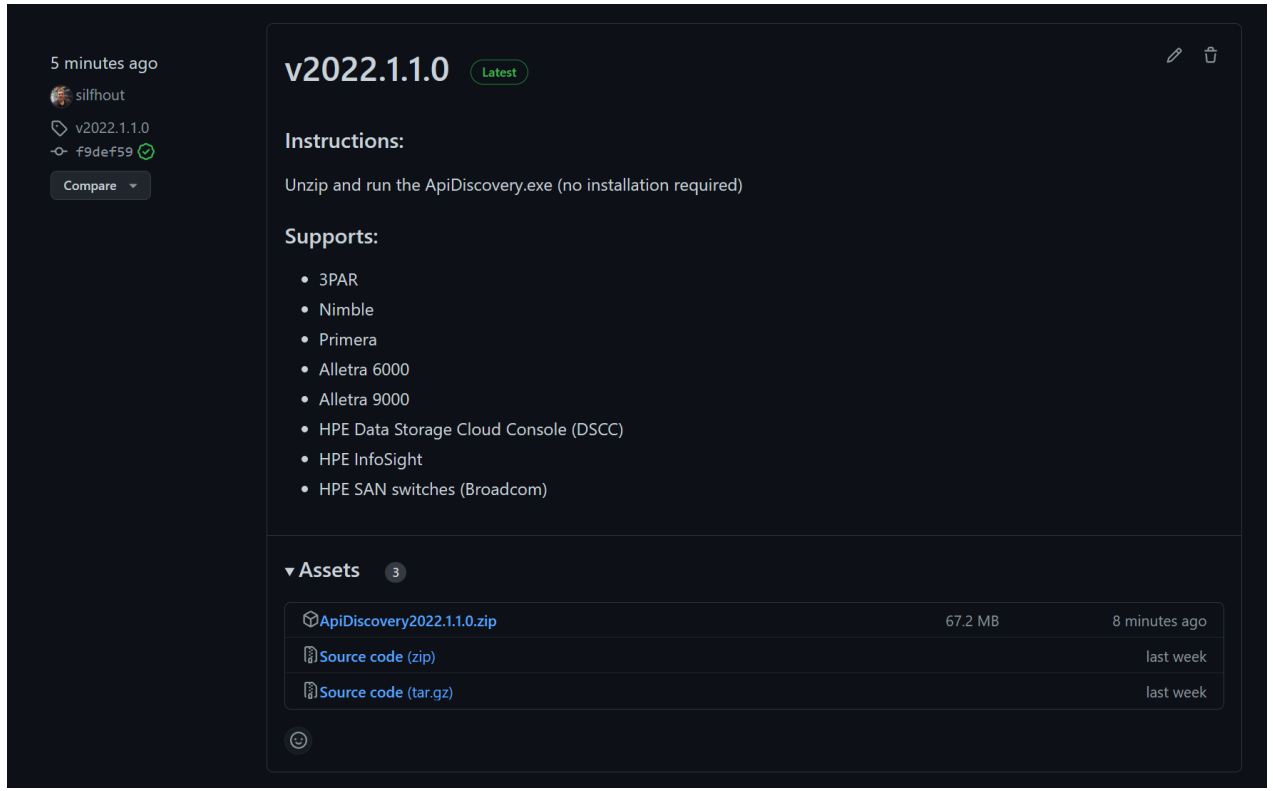
APIDISCOVERY

Where To Get The App

- Generic information and release notes are available from:
  HewlettPackard/ApiDiscovery (github.com) https://github.com/HewlettPackard/ApiDiscovery
- Download the ApiDiscovery app from:
  Releases · HewlettPackard/ApiDiscovery (github.com) https://github.com/HewlettPackard/ApiDiscovery/releases

Download the zipfile by clicking the ApiDiscovery<version>.zip file in the Assets panel.

When downloaded, unzip and run ApiDiscovery.exe



Aruba - enable REST interface on the switch

- REST interface on Aruba switches are **enabled by default.**
- "`rest-interface`" command enables the REST functionality on the switch.
- REST interface **requires one of the 2 web management methods** (HTTP or HTTPS) to be enabled on the switch.
- You can restrict the access towards the REST interface on the switch by configuring a username and a password on the switch.
- Newer software versions xx.16.08 and above support RADIUS authentication for REST login.
- "`rest-interface session-idle-timeout`" can be used to extend or reduce the session idle timeout. Default value is 600s.
- Please visit: *https://developer.arubanetworks.com/aruba-aoscx/docs/introduction*

Thank you!