

Introduction and Overview of Redfish

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DMTF - VP of Alliances

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The Distributed Management Task Force

An Industry Standards Organization

- Developing manageability standards for 24 years (est. 1992)
- Membership includes 65 companies and industry organizations
- With active chapters in China and Japan

Allied with

- 14 standard development organizations (alliance partners)
- 80+ universities and research organizations (academic alliance partners)

Focused on manageability standards

- For the management of on-platform, off-platform, network services and infrastructure domains
- Which are recognized nationally (ANSI/US) and internationally (ISO)

Agenda

Redfish - a modern manageability interface for the data center

- Why a new interface?
- Redfish capabilities
- Elements of the Redfish standard
- A JSON Response

Redfish manageability models

- Server/Compute model
- Storage model
- Network Device model

Redfish tools

- The conformance tool chain and OCP

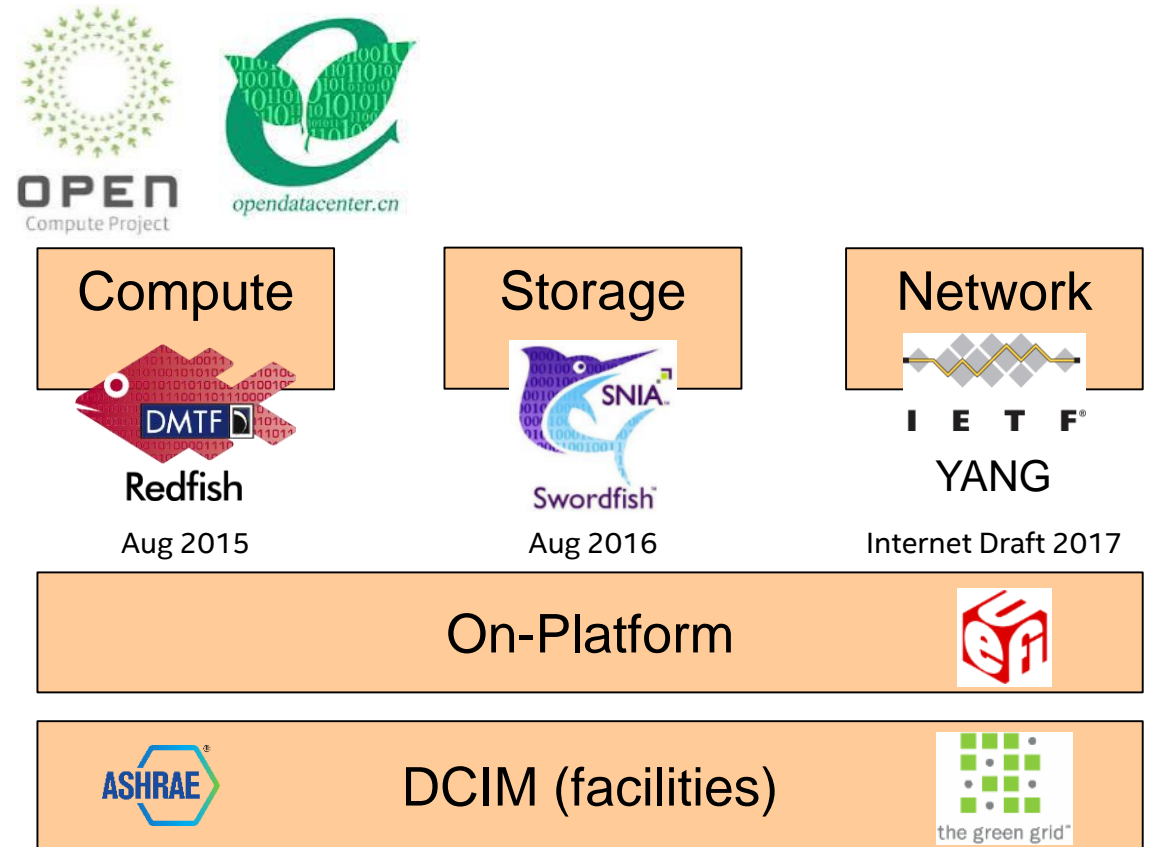
"Redfish – a modern interface for managing the data center"

A RESTful interface

- To manage compute, storage, network and DCIM
- Leverages existing Internet standards and tool chains
- Usable by professions and amateurs

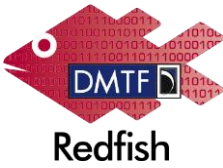
Resource models for managing

- Common platform manageability
- (Power, thermal, cooling, inventory, reboot, firmware update, get telemetry, etc.)
- Domain specific capabilities



DCIM = Data Center Infrastructure Management

Redfish: Why a New Interface?



Market shifting to scale-out solutions

- Datacenters have a sea of simple servers and multi-node servers
- Customers exhausting the functionality of current manageability interfaces

Customers asked for a modern interface

- Single simple interface for managing all datacenter platforms and devices
- An interface which uses cloud/web protocols, structures, security models and tool chains
- Schemas to allow introspect of interface and programmatic enablement

HTTP

```
HTTP GET https://<ip_addr>/redfish/v1/Systems/CS_1
```

**Python
code**

```
rawData = urllib.urlopen('https://<ip_addr>/redfish/v1/Systems/CS_1')  
jsonData = json.loads(rawData)  
print( jsonData['SerialNumber'] )
```

Output

```
1A87CA442K
```

Redfish Capabilities



Chassis Information

- Identification and asset information
- State and status
- Temperature sensors and fans
- Power supply, power consumption and thresholds
- Set power thresholds

Compute Manageability

- Reboot and power cycle server
- Configure BIOS settings
- Change boot order and device
- Update BIOS and firmware
- Memory and NVDIMMs
- Local network interface
- Local storage
- State and status

Management Infrastructure

- View / configure BMC network settings
- Manage local BMC user accounts
- Configure serial console access (e.g. SSH)

Discovery

- Physical hierarchy (rack/chassis/server/node)
- Compute service (servers)
- Management hierarchy (rack mgr, tray mgr, BMC)

Security

- Use HTTPS
- Map roles to privileges

Access and Notification

- Subscribe to published events
- Inspect Logs
- Access via host interface

Composition

- Specific composition
- Enumerated composition

The Redfish Standard

Redfish is composed of

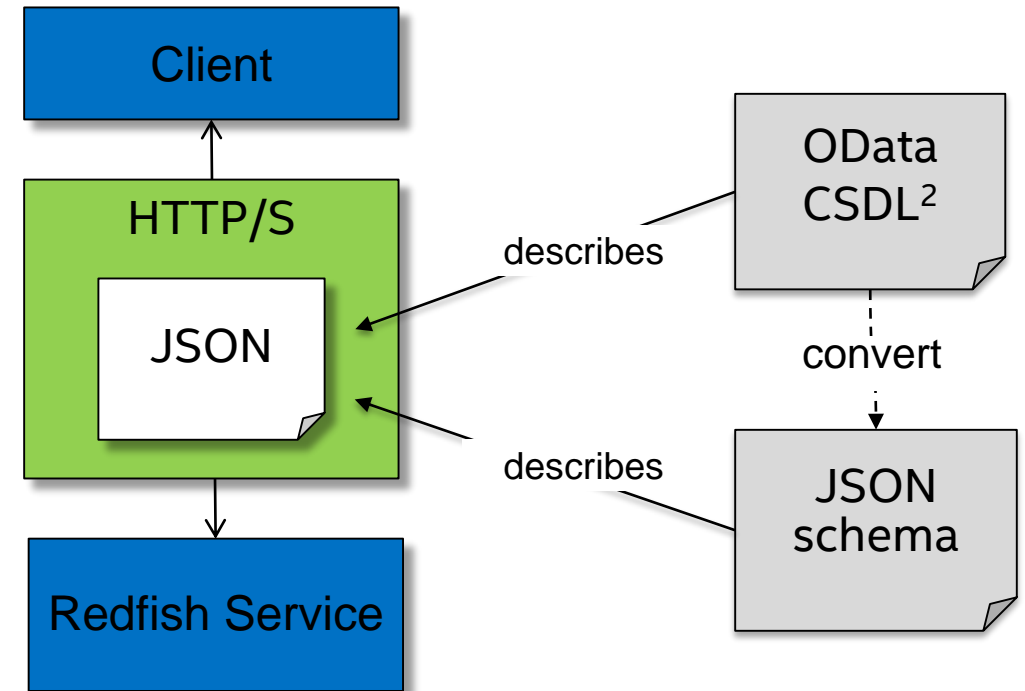
- An Interface definition
- Various Model schema

Redfish Interface (RESTful)

- HTTP/HTTPS - protocol
- JSON – format of content
- Schemas for JSON responses (enables tool chain and introspection)

Redfish Models and Schema

- DMTF publishes the models for platforms and compute/servers
- Other organization may create models for their management domain



¹OData is an OASIS Standard

²CSDL = Common Schema Definition Language

JSON response

HTTP GET /redfish/v1/Systems/CS_1

Note

- Redfish is hyper-media
- Cannot presume a resource hierarchy

Simple properties

Complex properties

Subordinate resources

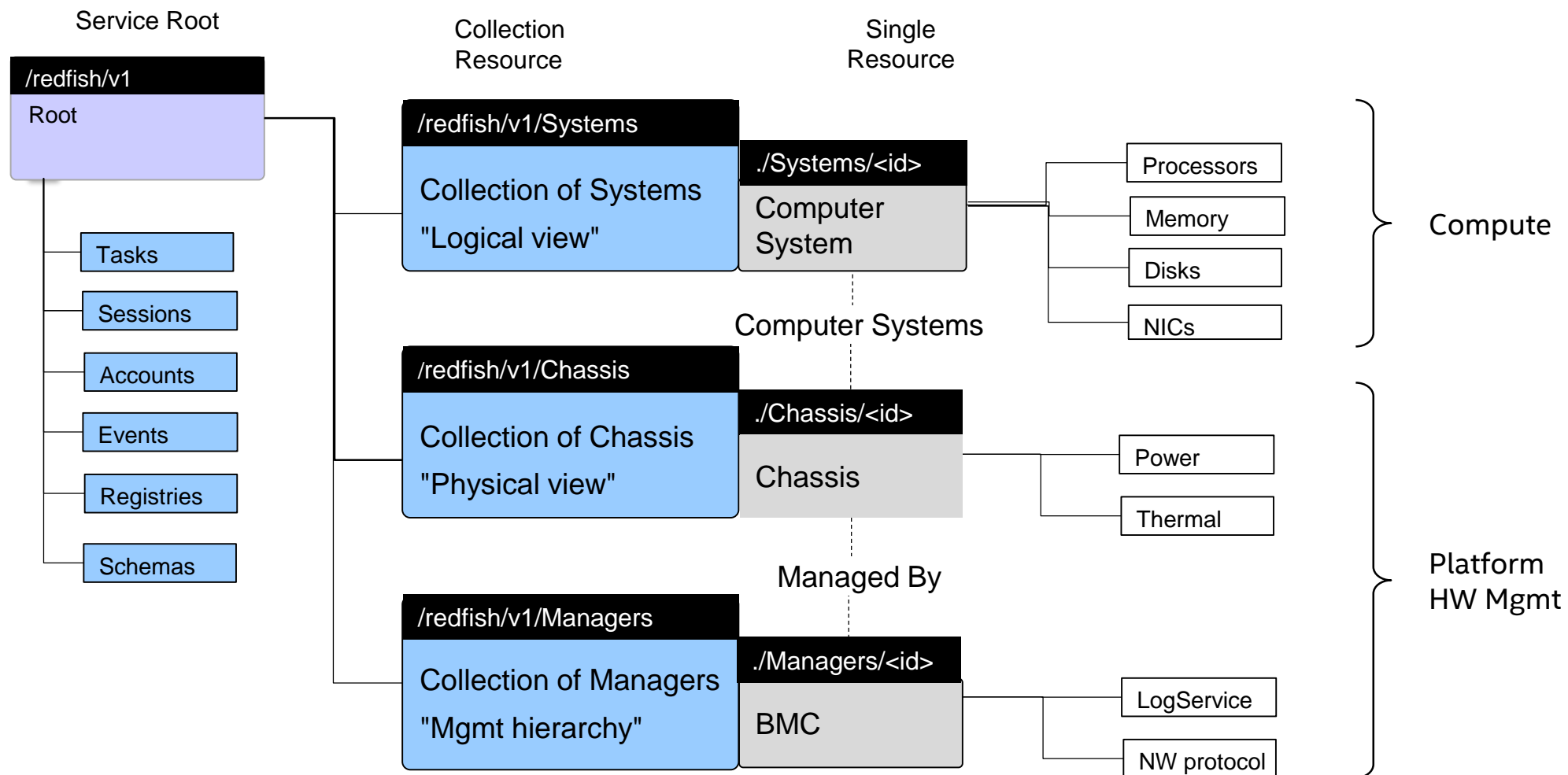
Associated resources

Actions

```
{
  "@odata.context": "/redfish/v1/$metadata#ComputerSystem.ComputerSystem",
  "@odata.id": "/redfish/v1/Systems/CS_1",
  "Id": "CS_1",
  "Name": "My Computer System",
  "SystemType": "Physical",
  "AssetTag": "free form asset tag",
  "Manufacturer": "Manufacturer Name",
  "Model": "Model Name",
  "SerialNumber": "2M220100SL",
  "PartNumber": "",
  "Description": "Description of server",
  "UUID": "00000000-0000-0000-0000-000000000000",
  "HostName": "web-srv344",
  "IndicatorLED": "Off",
  "PowerState": "On",
  "BiosVersion": "P79 v1.00 (09/20/2013)",
  "Status": { "State": "Enabled", "Health": "OK", "HealthRollup": "OK" },
  "Boot": { ... },
  "ProcessorSummary": { ... },
  "MemorySummary": { ... },
  "TrustedModules": [ { ... } ],
  "Processors": { "@odata.id": "/redfish/v1/Systems/CS_1/Processors" },
  "Memory": { "@odata.id": "/redfish/v1/Systems/CS_1/Memory" },
  "EthernetInterfaces": { "@odata.id": "/redfish/v1/Systems/CS_1/EthernetInterfaces" },
  "SimpleStorage": { "@odata.id": "/redfish/v1/Systems/CS_1/SimpleStorage" },
  "LogServices": { "@odata.id": "/redfish/v1/Systems/CS_1/LogServices" },
  "SecureBoot": { "@odata.id": "/redfish/v1/Systems/CS_1/SecureBoot" },
  "Bios": { "@odata.id": "/redfish/v1/Systems/CS_1/Bios" },
  "PCIeDevices": [ { "@odata.id": "/redfish/v1/Chassis/CS_1/PCIeDevices/NIC" } ],
  "PCIeFunctions": [ { "@odata.id": "/redfish/v1/Chassis/CS_1/PCIeDevices/NIC/Functions/1" } ],
  "Links": {
    "Chassis": [ { "@odata.id": "/redfish/v1/Chassis/Ch_1" } ],
    "ManagedBy": [ { "@odata.id": "/redfish/v1/Managers/Mgr_1" } ],
    "Endpoints": [ { "@odata.id": "/redfish/v1/Fabrics/PCIe/Endpoints/HostRootComplex1" } ],
  },
  "Actions": {
    "#ComputerSystem.Reset": {
      "target": "/redfish/v1/Systems/CS_1/Actions/ComputerSystem.Reset",
      "@Redfish.ActionInfo": "/redfish/v1/Systems/CS_1/ResetActionInfo"
    }
  }
}
```


Redfish Model – Compute and Platform

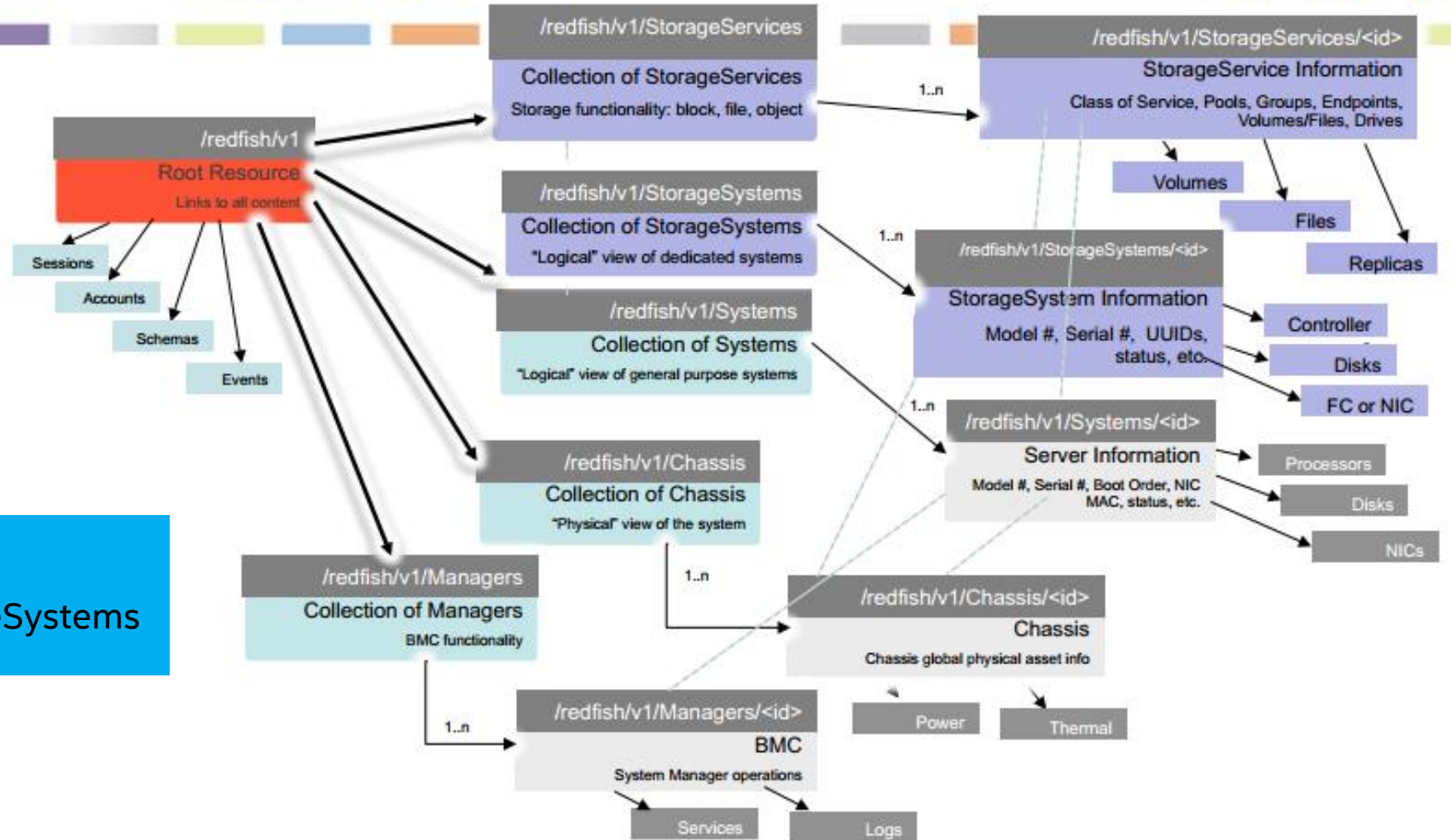
HTTP GET /redfish/v1/Systems/CS_1/Processors/2



Storage Model



Adding Storage to Redfish: Swordfish



- Reuses chassis model
- Adds StorageServices & StorageSystems

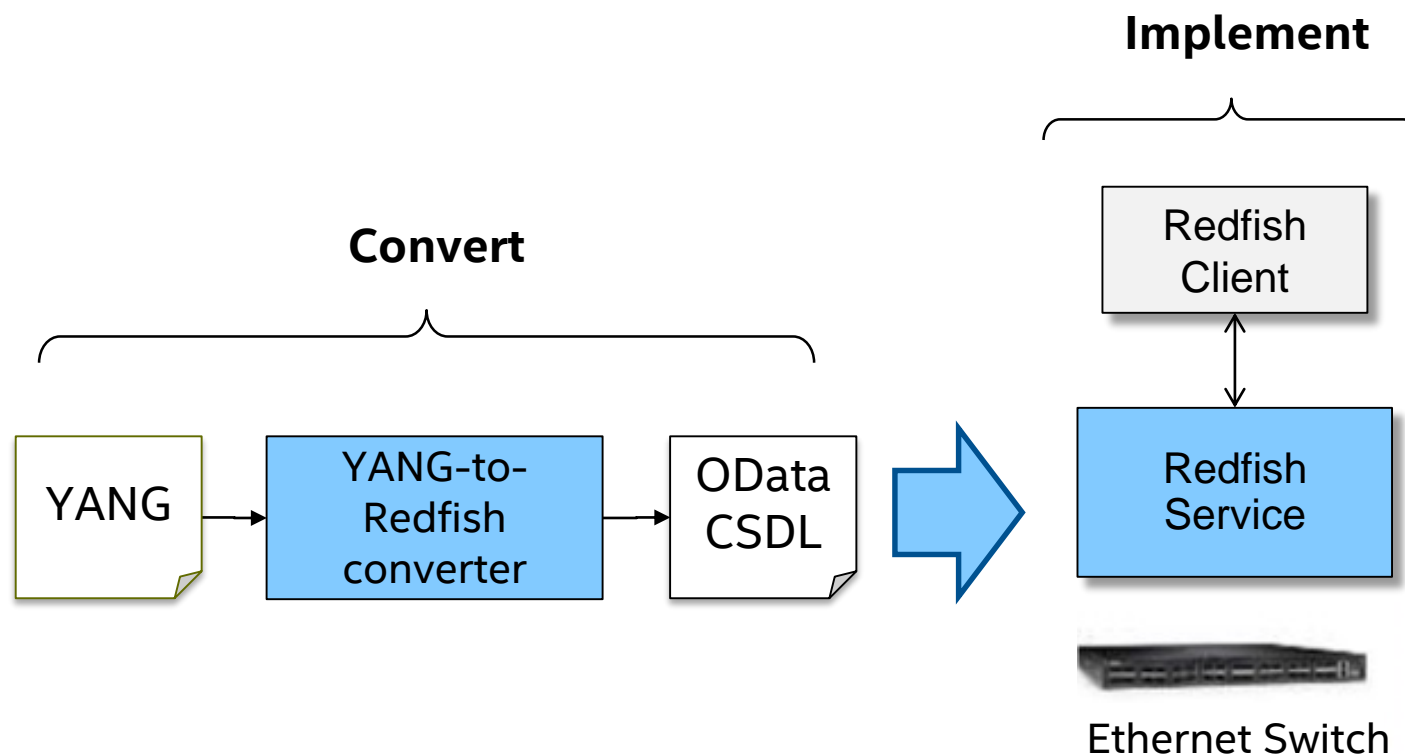
Network Model – Convert from YANG models

- ✓ Phase 1 - convert a small set of YANG models to Redfish models
 - Proves out the process, and validates the converter

Phase 2 – larger list of YANG models

Phase 1 (Ethernet Switch)

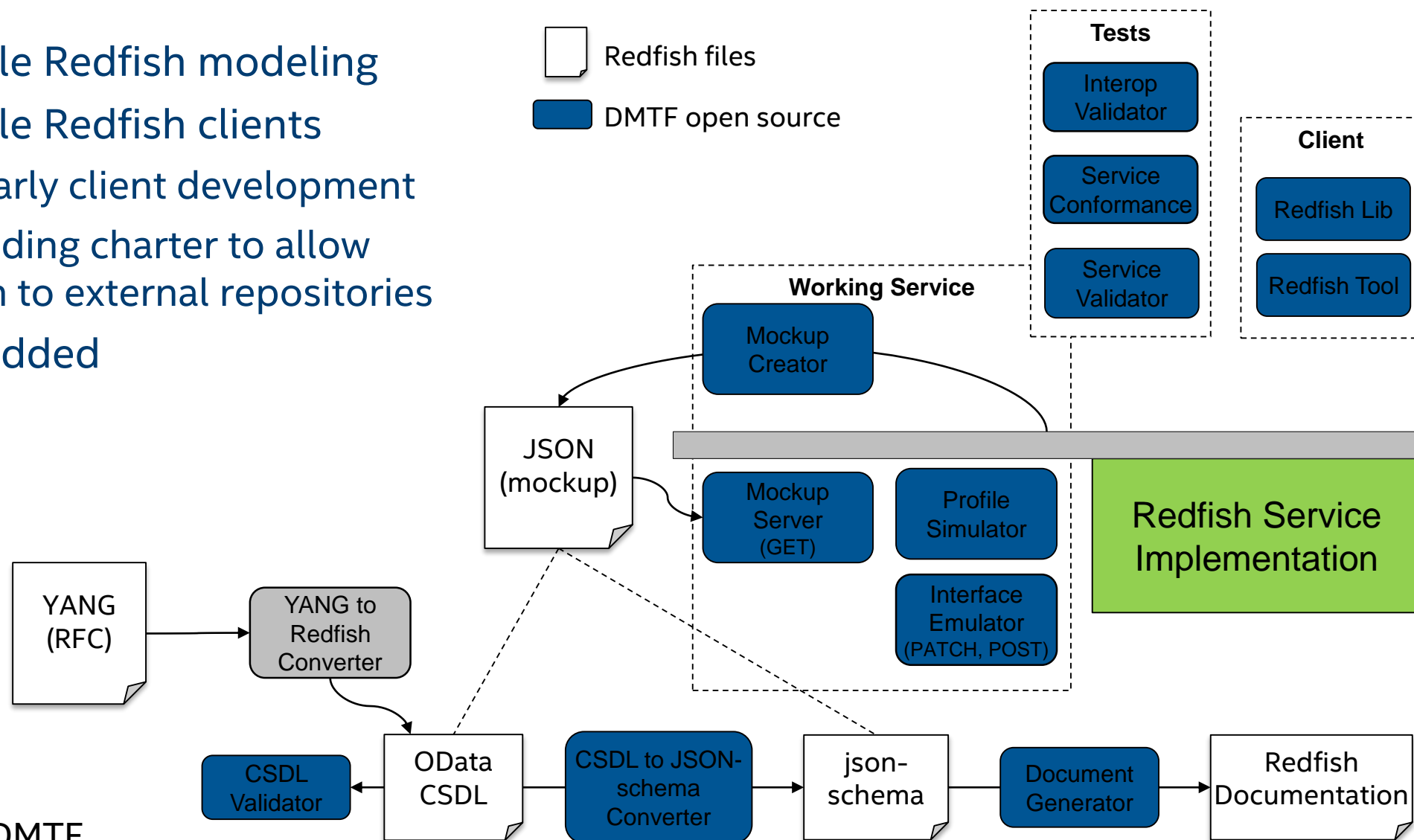
- RFC7223 (Interfaces)
- RFC7224 (IANA Interface types)
- RFC7277 (IPv4 and IPv6)
- RFC7317 (system, system_state, platform, clock, ntp)



Redfish Tools



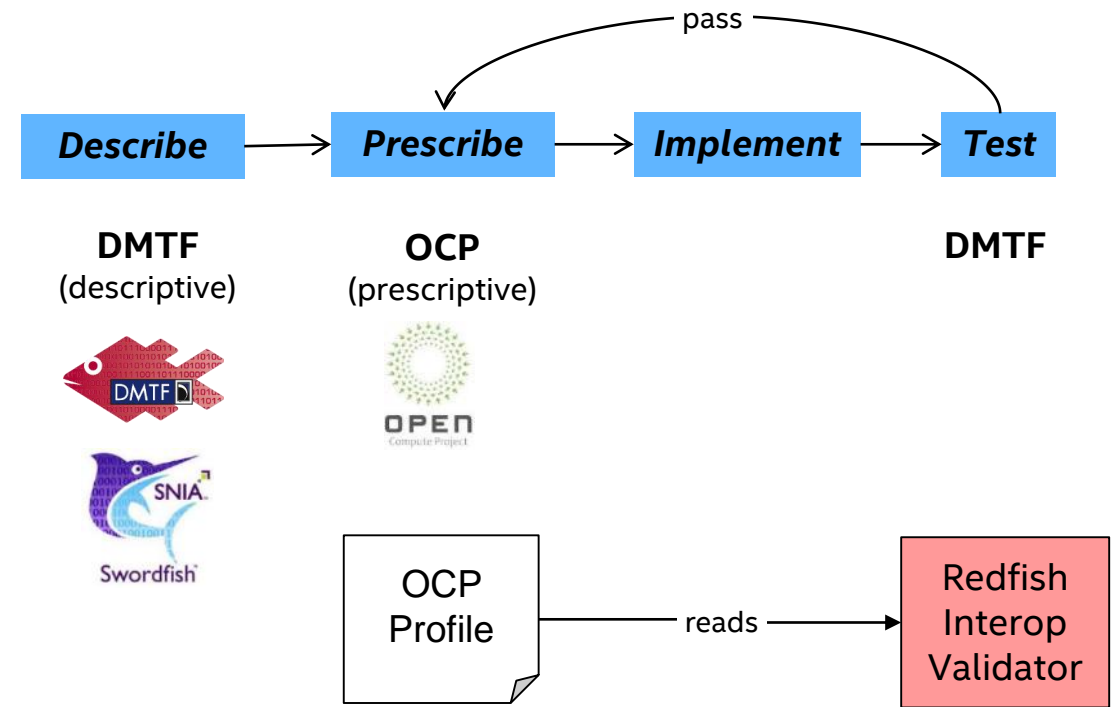
- Tools to enable Redfish modeling
- Tools to enable Redfish clients
 - Ability for early client development
 - DMTF extending charter to allow contribution to external repositories
- Tools being added



<http://github.com/DMTF>

Conformance

- DMTF describes a standard for a manageability interface and models
- OCP could prescribe conformance requirements for the Redfish model elements (resources, properties, actions) in a profile document
- DMTF develops a conformance test which reads a profile document
 - <https://github.com/DMTF/Redfish-Interop-Validator>



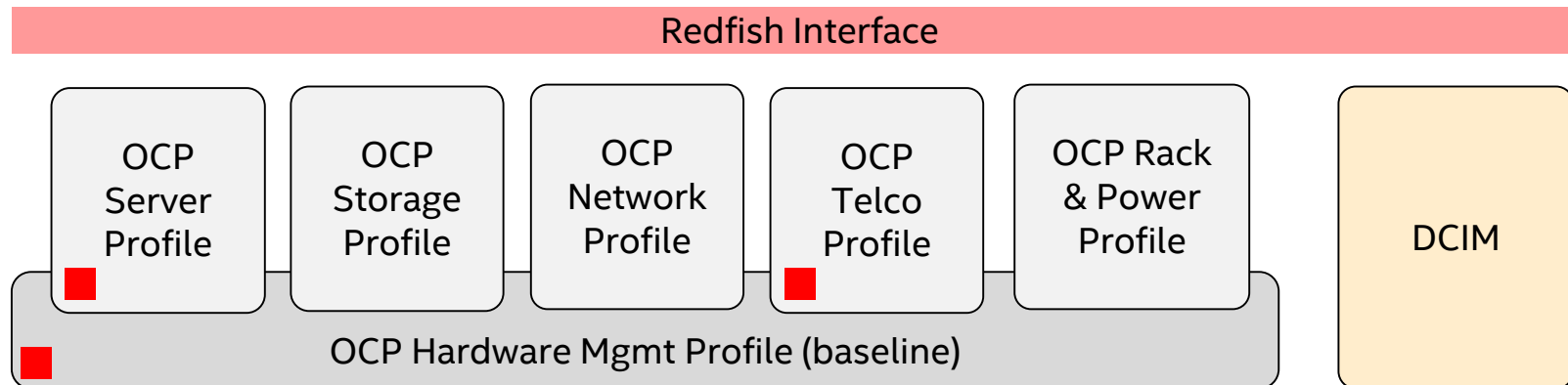
Baseline and Platform specific profiles

OCP HW Management project

- Specifies the baseline which is common across all OCP platforms
- DMTF members have been participating in the HW Mgmt project

OCP 'platform' projects




- Specifies platform specific profile, which references and extends baseline profile (proper superset?)




Public Redfish Collateral

- Redfish Github github.com/DMTF
- Redfish Community Forum redfishforum.com
- Redfish Developer's Hub redfish.dmtf.org
- Specs, presentation dmtf.org/standards/redfish
- Redfish Forum (SPMF) dmtf.org/standards/spmf



Redfish Specification Forum				
Home Help Search Welcome Guest. Please Login or Register .				
Redfish Specification Forum > Home				
News Welcome to our new forum!				
Specification, Protocol, Schema and Payloads				
Board	Threads	Posts	Last Post	
 Protocol and Specification Discussion about the Redfish Specification and the RESTful HTTP protocol. Moderator: Admin	1	2	Retrieving individual properties by j2hilland Sep 12, 2016 at 7:42am	
 CSDL and json-schema Discussion about the contents of the standard Redfish schemas, and the published CSDL (XML) or json-schema definition files	1	2	How to use the Location property under Resource ? by mraimeri Aug 12, 2016 at 6:33am	
 Feature Requests Requests to add features to the Redfish Specification, make additions to existing Schema, or to create a new Schema.	1	2	Creating a webinterface/KVM-over-IP session for user by jautor Aug 12, 2016 at 6:33am	

 DISTRIBUTED MANAGEMENT TASK FORCE, INC.
Redfish™ Developer Hub


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Welcome to the Redfish Developer Hub

DMTF's Redfish™ API is an open industry standard specification and schema that helps enable simple and secure management of modern scalable platform hardware. By specifying a RESTful interface and utilizing JSON and OData, Redfish helps customers integrate solutions within their existing tool chains. An aggressive development schedule is quickly advancing Redfish toward its goal of addressing all the components in the data center with a consistent API.

Welcome Developers

The 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.**

 DISTRIBUTED MANAGEMENT TASK FORCE, INC.
Redfish Resource Explorer

[Home](#) [Mockup](#) [About the Redfish API](#)

Development Mockup

Explore the Resources

- Main
- Systems
 - 1
 - 2
- Chassis
- Managers
- Task Service
- Session Service
- Account Service
- Event Service
- JsonSchemas

```
redfish > v1 > Systems > 1
{"@Redfish.Copyright": "Copyright \u00a9 2014-2015 Distributed Management Task Force, Inc. (DMTF). All rights reserved.",
"@odata.context": "/redfish/v1/$metadata#Systems/Member/Entity",
"@odata.id": "/redfish/v1/Systems/1",
"@odata.type": "#ComputerSystem.1.0.0.ComputerSystem",
"id": "1",
"name": "My Computer System",
"systemType": "Physical",
"assetTag": "Free form asset tag",
"manufacturer": "Manufacturer Name",
"model": "Model Name",
"sku": "",
"serialNumber": "2M22010086",
"partNumber": "",
"description": "Description of server",
"uuid": "00000000-0000-0000-0000-000000000000"}
```

Summary

Redfish has rapidly established itself as the modern interface for data center management

- Rapid advances in the interface with multiple schema releases
- Expediting the tool-chain for extensions and usage

The industry have reacted favorably (standards orgs, companies)

- Alliance partnerships with SNIA, UEFI, OCP, The Green Grid, ASHRAE, CSCC

Academic research is underway (with academic alliance partner members)

- Texas Tech University - Cloud and Autonomic Computing Center
- Barcelona Supercomputing Center

Questions?