Redfish Basic Server Interoperability Profile

DMTF Scalable Platforms Management Forum
OCP Workshop, September 2017

Disclaimer

- The information in this presentation represents a snapshot of work in progress within the DMTF.
- This information is subject to change without notice. The standard specifications remain the normative reference for all information.
- For additional information, see the Distributed Management Task Force (DMTF) website.

Goals

- An “Interoperability Profile” provides a common ground for Service implementers, client software developers, and users
  - A profile would apply to a particular category or class of product (e.g. “Front-end web server”, “NAS”, “Enterprise-class database server”)
  - It specifies Redfish implementation requirements, but **is not** intended to mandate underlying hardware/software features of a product
  - Provides a target for implementers to meet customer requirements
  - Provide baseline expectations for client software developers utilizing Redfish
  - Enable customers to easily specify Redfish functionality / conformance in RFQs
- Create a machine-readable Profile definition
  - Document must be human-readable
  - Can be created by dev/ops personnel and non-CS professionals
- Enable authoring of Profiles by DMTF, partner organizations, and others
- Create open source tools to document and test conformance

Implementation

- Redfish Interoperability Profile is a Machine-readable JSON document
  - Schema-backed (RedfishProfile.v1_0_0) JSON definition
  - This file will be read by conformance and documentation tools
- DMTF specification (DSP0272) provides instructions to create a profile
- Creating open source tools for conformance testing
  - Leverages existing Redfish Conformance tools and applies profile requirements
- Creating a tool for generating profile documentation
  - Documentation generator produces profile-specific schema/property view
  - Uses a combination of the JSON profile document and a Markdown ‘supplement’
  - Supplemental text provides context and clarification on the Profile’s purpose
  - Tool can produce different output formats: ‘verbose’, ‘terse’ and CSV file

Profile Document Functionality

- Required resources (schema), objects, or properties
  - Simple requirements apply to every instance of the Resource
  - Conditional requirements make additions for specific cases
- "If Implemented" resources, object, or properties
  - Must appear if underlying feature is implemented in the product
    - Example: Fan[] array required in Chassis that have fans…
  - "If Implemented" conformance usually not testable by automated tools
- Conditional Requirements
  - Items required under certain circumstances or for sub-classes of products
  - Based on values of adjacent properties or location in the resource tree
    - Example: EthernetInterface resource required under each 'Manager'
- Registry Requirements
  - Support for standard messages for errors and events

Redfish Interoperability Profile

BASIC SERVER PROFILE

Basic Server Profile

- Goals of the Profile:
  - Meet management needs of scale-out, front-end server users
  - Leverage existing OCP HW Remote Management requirement list
  - Be inclusive – shipping or expected Redfish implementations conform
    - Commonly implemented BMC features and/or IPMI-over-LAN functions
    - Requirements come mostly from Redfish v1.0.0 schemas
  - Does not require host-based software to implement required properties
- Publication
  - DMTF will provide posting on web and documentation
  - Seeking approval / endorsement from OCP
  - Would like to use OCP name in profile's name or description
  - Encourage future OCP specifications to reference
- Future effort
  - Next profile is "richer" Redfish adding properties defined in 2016-2017

Basic Server Profile Requirements (1 of 3)

- Service Root / Redfish infrastructure
  - UUID, RedfishVersion
  - Redfish Session-based connections
  - User Accounts
- Manager (BMC functions)
  - UUID, Firmware Version
  - Serial Console support – IPMI (SoL) or SSH
  - Event Log – must have ability to Clear the log
  - BMC's Ethernet / IP configuration
    - MAC Address, Link Status, Speed
    - IP address (v4 and/or v6) with gateway and subnet
    - Hostname, FQDN, Name Servers
    - Port addresses for HTTP, HTTPS
    - Port addresses for SSH and SSDP (recommended)

Basic Server Profile Requirements (2 of 3)

- Chassis (Redfish physical view of server)
  - Asset Tag (recommended)
  - SKU or Part Number – at least one of those
  - Manufacturer, Model, Serial Number
  - Power State
  - Indicator LED (recommended)
- Power
  - Power consumption, capacity
  - Power limit functionality
- Thermal
  - Fan speed and identifiers (if fans included in the design)
  - Temperature readings for “intake”, “System Board” and each CPU

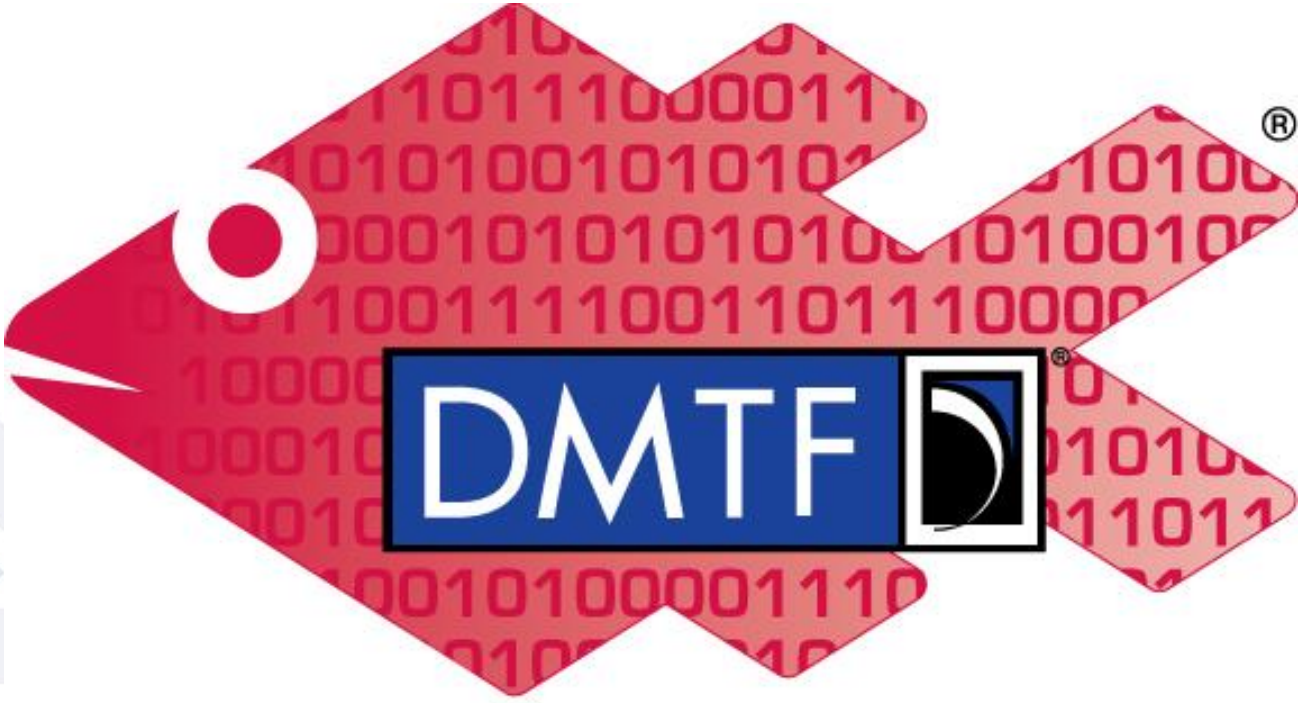
Basic Server Profile Requirements (3 of 3)

- Computer System (Redfish logical view of server)
  - Asset Tag – must be settable by user via Redfish
  - Serial Number, Manufacturer, Model
  - SKU or Part Number – at least one of those
  - UUID, BIOS Version
  - Power State
  - Indicator LED – controlled via Redfish
  - Boot Source – ability to set 'one time boot' option, including UEFI targets
  - CPU quantity and model
  - Total system memory
  - Host NIC information (recommended)
    - MAC Address, Link Status, Speed
    - IP address (v4 and/or v6) with gateway and subnet
    - Hostname, FQDN, Name Servers

Next Steps

- OCP Hardware Mgmt group “Approve” content of the Profile
- OCP decision on naming / usage of “OCP” in description
- DMTF to publish, complete open source tools for conformance testing

Q&A & Discussion



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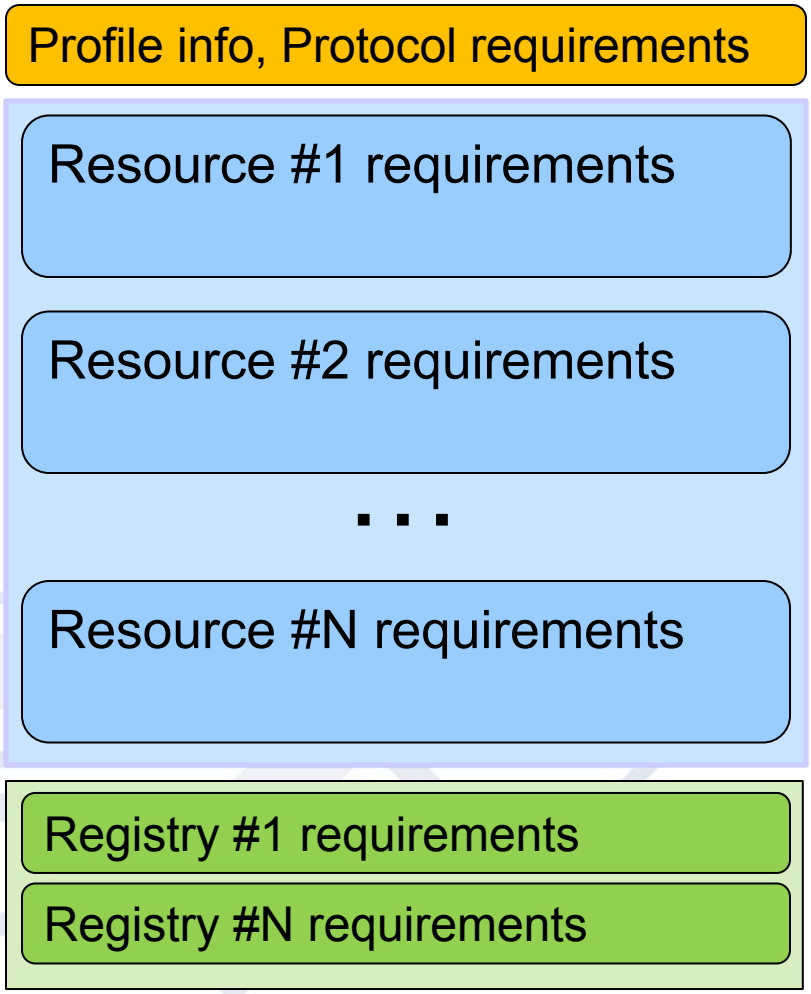
BACKUP – JSON PROFILE DOCUMENT

Redish Interoperability Profile Document

- JSON document with simple structure to list resources and properties
  - Format allows easy comparison to a retrieved Redfish payload
    - Ex. “PropertyRequirements” object with Redfish properties
  - Can build definition on top of other Profile(s)
  - Also allows specification of Redfish Protocol features, Resources/Properties, Actions and Registries.
- Versioning support in both Profile and Resource requirements
  - Profile is a static definition once published
    - Does not increase in scope as schemas are revised
  - Recommend that changes to profile occur with “major” revisions
    - Allow for errata, but Profile should be built for longevity
    - Example: “Basic Server v1”, “Basic Server v2”

Profile document structure



- Each section a JSON object
- Resource (schema) and Registry objects follow the names of the defining schema
  - e.g. “EthernetInterface”
- Property-level requirement nested within Resource requirements, named to follow the defined property name
  - e.g. “AssetTag”, “SpeedMbps”

Profile-level information and Protocol Requirements

```
"ProfileName": "Anchovy",
"Version": "1.0.2",
"Author": "Pizza Box Project",
"Purpose": "This is a sample Redfish profile.",
"ContactInfo": "pizza@contoso.com",
"RequiredProfiles": {
     "DMTFBasic": {
      "MinVersion": "1.0.0",
},
     “ContosoPizza”: {
      “OwningEntity”: “Other”,
      “OwningEntityName”: “Contoso”
      “Source”: “contoso.com/profiles”,
      “MinVersion”: “1.0.0”
     }
 },
“ProtocolRequirements”: {
      “MinVersion”: “1.0.0”,
      “DiscoveryRequired”: false
},
```

- Basic information
  - Name, version, author, etc.
- Ability to include other Profiles to build upon past work
  - But profile cannot loosen requirements included from other profiles, only add additional requirements
- “Protocol requirements” are Redfish features which are not part of the JSON response payload(s).

Resource (schema) level requirements

```
"ContosoTimeMachine": {
   "OwningEntity": "Other",
   "OwningEntityName": "Contoso",
   “Repository": "www.contoso.com/schemas",
   “ReadRequirement”: “Mandatory”,
   "MinVersion": "1.2.0",
   "PropertyRequirements": {
      "CurrentTime": {},
      "DestinationTime": {},
      "IsGrandfatherAlive": {
         "Requirement": "Recommended"
      },
      "ParadoxDetected": {
         "Requirement": "IfImplemented"
      }
   }
}
```

- Organized by schema name
- Profile can include requirements from any number of standard or OEM-defined schemas
- Resource level “ReadRequirement” sets need for schema-required properties
- Property level requirements contained in resource-level object
- “MinVersion” – minimum schema version required

Property level - basic features

```
"ComputerSystemCollection": {
   “PropertyRequirements”: {
      "Members": {
     "MinCount": 1
      }
    }
},
"ComputerSystem": {
   "MinVersion": "1.1.0",
   "PropertyRequirements": {
      “SystemType”: {
     “Values”: [“Physical”],
     “ReadRequirement”: “Mandatory”
      },
      “AssetTag": {
     “ReadRequirement": “Mandatory“,
     “WriteRequirement”: “Mandatory”
      },
      "Manufacturer": {},
      "Model": {
         “ReadRequirement": "Recommended"
       },
 . . .
```

- JSON objects follow property names
  - Un-listed properties have no requirements
  - Empty objects are by default ‘Mandatory’
- “ReadRequirement”:
  - Default value is ‘Mandatory’
  - Recommended, If-Implemented, and Conditional support
- “MinCount”:
  - Minimum count of non-NULL items in array
- “WriteRequirement”:
  - If property must support PATCH or PUT
- “Values”:
  - Require specific or “any of” values for a property. Also supports arrays

Property level – Conditional requirements

```
"EthernetInterface": {
   "PropertyRequirements": {
      "MACAddress": {},
      “HostName": {
         “ReadRequirement": "Recommended",
         “ConditionalRequirements": [{
       "SubordinateToResource":
           ["ComputerSystem“,
                 ”EthernetInterfaceCollection”],
       “ReadRequirement": “Mandatory"
          }]
      },
      "IPv4Addresses": {
         “ReadRequirement": “Mandatory",
         "MinCount": 1,
         “ConditionalRequirements": [{
       "SubordinateToResource":
           ["ComputerSystem“,
                 ”EthernetInterfaceCollection”],
       “ReadRequirement": “Mandatory“
       "MinCount": 2
      }]
}
```

- ‘ConditionalRequirements’ apply to the property if one or more conditions are met
- ‘Purpose’ text provides justification for the conditional requirement
- SubordinateToResource
  - If resource matches the parent hierarchy, requirement applies
- Comparison Property / Values
  - Using another property within the resource as key, add requirement if value of the key matches a list

Property level – 'Conditional' Value example

```
"IndicatorLED": {
   "ReadRequirement": "Recommended",
   "WriteRequirement": "Recommended",
   "Conditions": [{
      "Purpose": "Physical and composed Systems
must have a writable Indicator LED",
      "ReadRequirement": "Mandatory",
      "WriteRequirement": "Mandatory",
      "Comparison": "AnyOf",
      "CompareProperty": "SystemType",
      "CompareValues": ["Physical", "Composed"]
   }]
}
```

- 'Comparison' provides test
- 'CompareProperty' name
  - May be at current object level or in parent objects (no peers)
- 'CompareValues' – one or more values to test against
- Requirement – applies if condition met
- 'ConditionalRequirements' is an array, allowing multiple conditions for a given property

Action level features

```
“ActionRequirements": {
   "Reset": {
      “ReadRequirement": “Mandatory",
      "Parameters": {
     "ResetType": {
        “MinSupportedValues": ["ForceOff", "PowerCycle"]
     }
      }
   }
}
```

- Organized by Action name within each Resource (schema)
- Allows for parameter requirements
- AllowableValues support

Registry level features

```
"Registries": {
   "Base": {
      "MinVersion": "1.0.0",
      "Source": "redfish.dmtf.org/registries",
      "Messages": {
      "Success": {},
      "GeneralError": {},
      "Created": {},
      "PropertyDuplicate": {}
      }
   },
   "ContosoPizzaMessages": {
      "OwningEntity": "Other",
      "OwningEntityName": "Contoso",
      "Repository": "contoso.com/registries",
      "ReadRequirement": "Mandatory"
   }
}
```

- Organized by registry name
- Allows for multiple registries
- Ability to include OEM registries
- Resource level "ReadRequirement" sets need for full Registry requirement
- Messages listed with individual 'Requirement' as needed