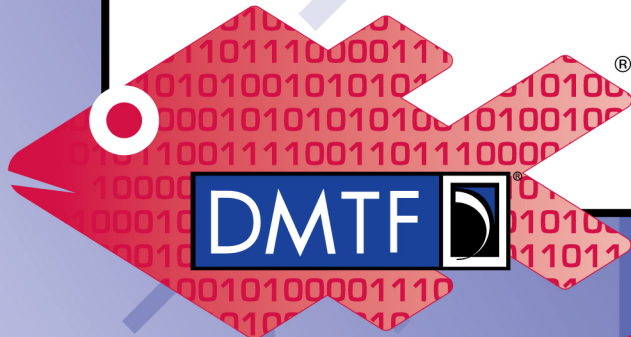




BIOS Configuration

Ghazi Belaam
HPE

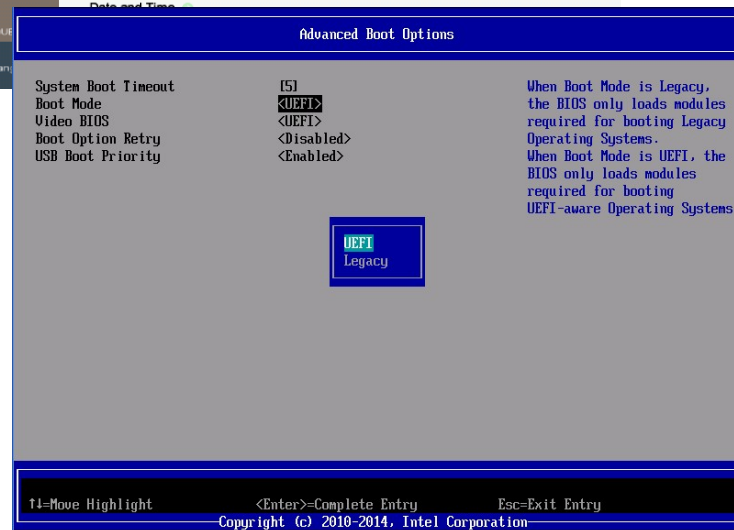
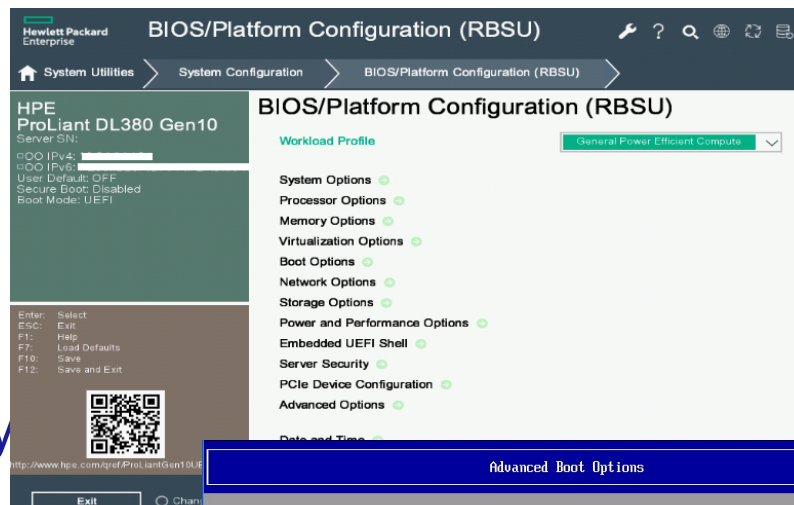


Redfish



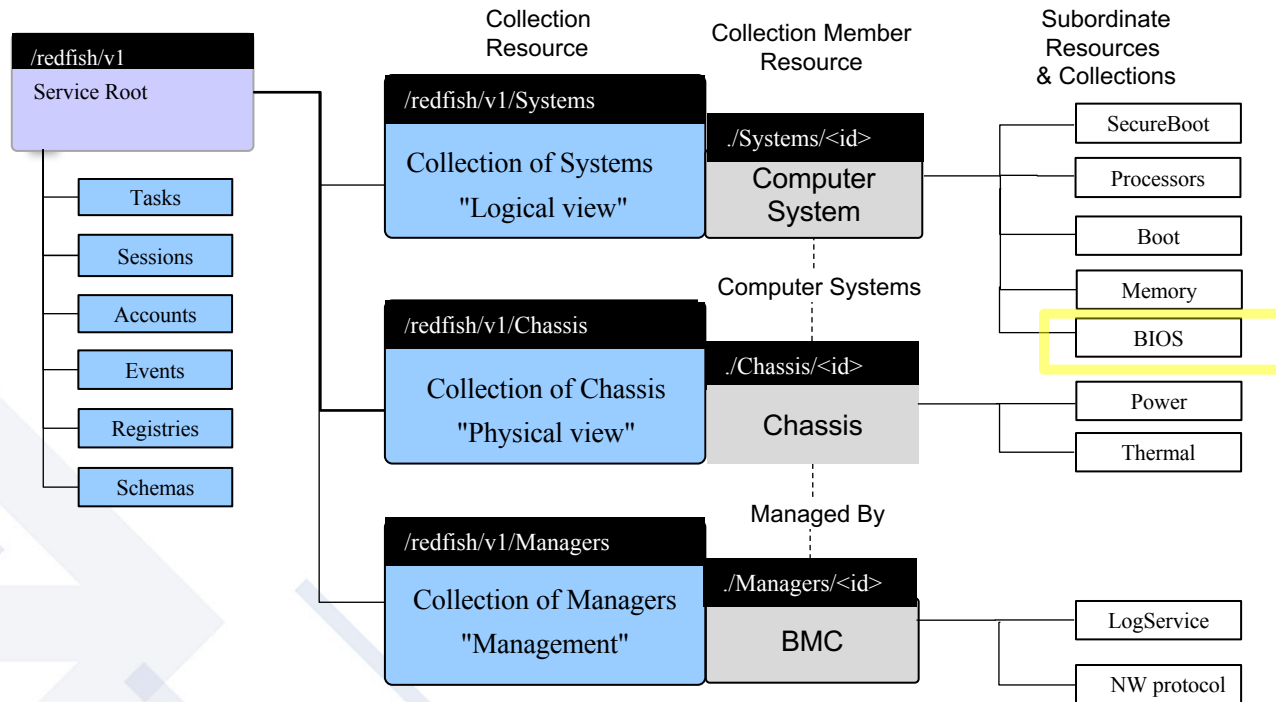
What is BIOS

- **Basic Input Output System**
- Used to configure the system
- Setup through BIOS Setup Utility
 - Usually accessed with a hot-key (F2,ESC, F10,...)
- Redfish give us the ability to configure BIOS settings





Redfish Resource Map (simplified)



GET <https://192.168.0.100/redfish/v1/Systems/{id}/Bios/>

Use the Redfish Resource Explorer (redfish.dmtf.org) to explore the resource map

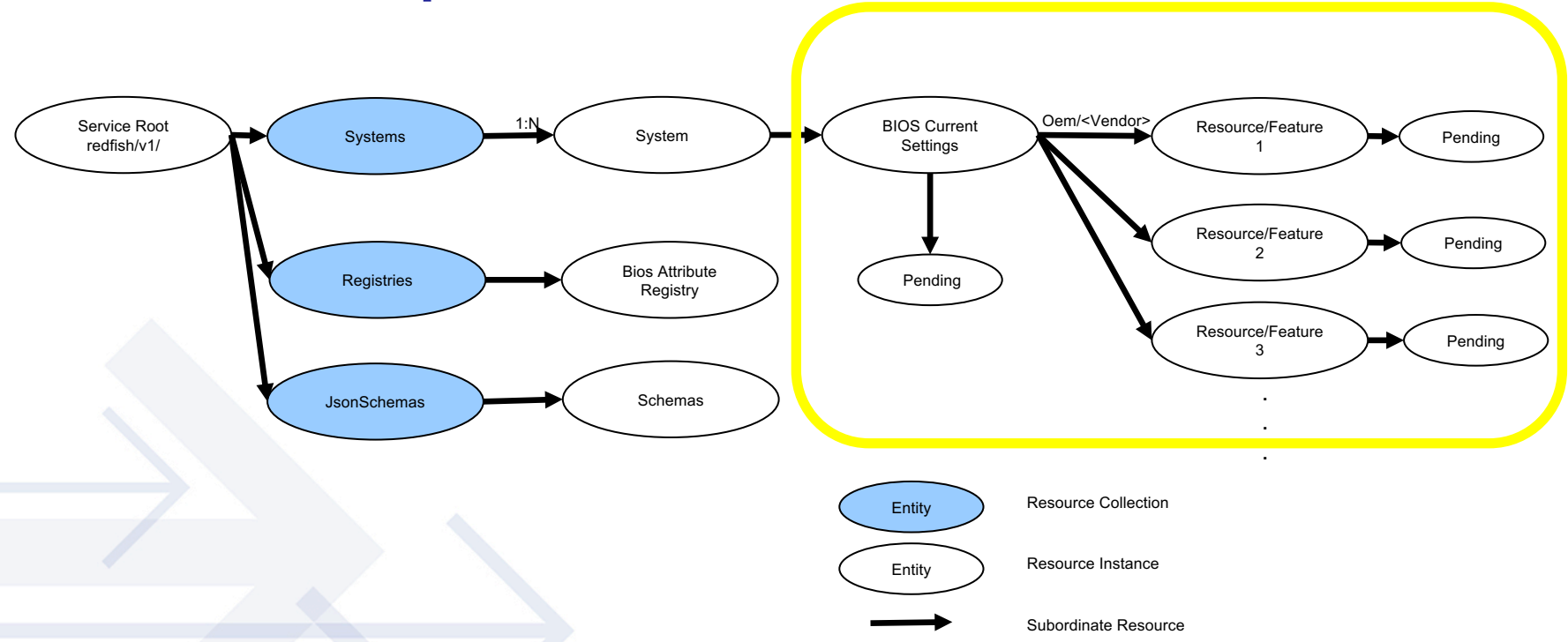


Schemas / Registries / Service

- A **schema** is a data model. The model defines the relationship between objects in the system, and defines which objects can contain or be contained by other objects.
- **Registries** are used in Redfish to optimize data being transferred from a Redfish Service. Registry Resources are those Resources that assist the client in interpreting Redfish Resources beyond the Redfish Schema definitions.
- A **Redfish service** is any product that implements the Redfish specification. It is the software or firmware that implements the specification, and serves up responses.



BIOS Model Map





Example of a BIOS Resource

```
{
  "@Redfish.Copyright": "Copyright 2016-2019 DMTF. All rights reserved.",
  "@odata.id": "/redfish/v1/Systems/1/Bios",
  "@odata.type": "#Bios.v1_1_0.Bios",
  "Id": "Bios",
  "Name": "BIOS Configuration Current Settings",
  "Description": "BIOS Configuration Current Settings",
  "AttributeRegistry": "BiosAttributeRegistryP89.v1_0_0",
  "@Redfish.Settings": {
    "@odata.type": "#Settings.v1_2_2.Settings",
    "ETag": "someetag",
    "Messages": [
      {
        "MessageId": "Base.1.0.PropertyNotWritable",
        "RelatedProperties": [
          "#/Attributes/ProcTurboMode"
        ]
      }
    ],
    "SettingsObject": {
      "@odata.id": "/redfish/v1/Systems/1/Bios/SD"
    },
    "Time": "2012-03-07T14:44.30-05:00"
  },
  "Actions": {
    "#Bios.ResetBios": {
      "target": "/redfish/v1/Systems/1/Bios/Actions/Bios.ResetBios"
    },
    "#Bios.ChangePassword": {
      "target": "/redfish/v1/Systems/1/Bios/Actions/Bios.ChangePassword"
    }
  },
}
```

```
  "Attributes": {
    "AdminPhone": "",
    "BootMode": "Uefi",
    "EmbeddedSata": "Raid",
    "NicBoot1": "NetworkBoot",
    "NicBoot2": "Disabled",
    "PowerProfile": "MaxPerf",
    "ProcCoreDisable": 0,
    "ProcHyperthreading": "Enabled",
    "ProcTurboMode": "Enabled",
    "UsbControl": "UsbEnabled",
    "ConsoleBaudRate": "115200"
  },
  "Links": {
    "ActiveSoftwareImage": {
      "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory/BIOS"
    },
    "SoftwareImages": [
      {
        "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory/BIOS"
      },
      {
        "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory/BackupBIOS"
      }
    ],
    "Oem": {}
  }
}
```



BIOS Current Settings

```
{
  "@odata.type": "#Bios.v1_0_3.Bios",
  "Id": "BIOS",
  "Name": "BIOS Configuration Current Settings",
  "AttributeRegistry": "BiosAttributeRegistryP89.v1_0_0",
  "Attributes": {
    "AdminPhone": "",
    "BootMode": "Uefi",
    "EmbeddedSata": "Raid",
    "NicBoot1": "NetworkBoot",
    "NicBoot2": "Disabled",
    "PowerProfile": "MaxPerf",
    "ProcCoreDisable": 0,
    "ProcHyperthreading": "Enabled",
    "ProcTurboMode": "Enabled",
    "UsbControl": "UsbEnabled"
  },
  "@odata.context": "/redfish/v1/$metadata#Bios.Bios",
  "@odata.id": "/redfish/v1/Systems/437XR1138R2/BIOS/"
}
```

Specifies the schema and version

Specifies the name of the registry

All Bios settings

Uri of the resource, a self pointer



BIOS Current Settings

```
{
  "@Redfish.Settings": {
    "odata.type": "#Settings.v1_0_0.Settings",
    "ETag": "9234ac83b9700123cc32",
    "Messages": [
      {
        "MessageId": "Base.1.0.PropertyValueNotInList",
        "RelatedProperties": [
          "#/Attributes/BootMode"
        ]
        "MessageArgs": [
          "Hello",
          "BootMode"
        ],
      }
    ],
    "SettingsObject": {
      "odata.id": "/redfish/v1/Systems/437XR1138R2/BIOS/Settings/"
    },
    "Time": "2018-03-07T14:44.30-05:00",
    "Actions": {
      "#Bios.ResetBios": {
        "target": "/redfish/v1/Systems/437XR1138R2/BIOS/Actions/Bios.ResetBios/"
      },
      "#Bios.ChangePassword": {
        "target": "/redfish/v1/Systems/437XR1138R2/BIOS/Actions/Bios.ChangePassword/"
      }
    }
  },
}
```

An annotation that tell the client this resource is not writable

Specifies a Message returned by the Redfish service

Points to the resource where changes should be made

The time settings were applied

Contain the list of actions supported



BIOS Current Settings

```
"Links": {  
  "ActiveSoftwareImage": {  
    "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory/BIOS"  
  },  
  "SoftwareImages": [  
    {  
      "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory/BIOS"  
    },  
    {  
      "@odata.id": "/redfish/v1/UpdateService/FirmwareInventory/BackupBIOS"  
    }  
  ],  
  "Oem": {}  
}
```

The hyperlinks associated with the Resource

OEMs and other third parties can extend the Redfish data model by creating new resource types.



Pending Settings

- A Settings Resource is used to represent the future intended state of a Resource

<https://<IP>/redfish/v1/systems/1/bios/settings/>

- PATCH /redfish/v1/systems/1/bios/settings/

Current AdminName = Fox, Pending AdminName = Dana

- GET /redfish/v1/systems/1/bios/

AdminName : Fox

- GET /redfish/v1/systems/1/bios/settings/

AdminName : Dana



Example: Getting the Boot Mode

```
import json
import requests

username = "administrator"
password = "password"
host = IP
baseuri = "https://" + host + "/redfish/v1/systems/1/"

# connect to the server and grab the BIOS resource and store
# in json formatted dictionary
bios_resource_raw = requests.get(baseuri+"BIOS", verify=False, auth=(username, password))
bios_resource = json.loads(bios_resource_raw.text)

#Get the boot mode and print it
boot_mode = bios_resource['Attributes']['BootMode']

print (boot_mode)

>> Uefi
```



Bios Attribute Registry

JSON

- @odata.type** : #AttributeRegistry.v1_0_0.AttributeRegistry
- Description** : This registry defines a representation of BIOS Attribute instances
- Id** : BiosAttributeRegistryU30.v1_2_00
- Language** : en
- Name** : U30 BIOS Attribute Registry
- OwningEntity** : HPE
- RegistryEntries
 - Attributes** :
 - Dependencies** :
 - Menus** :
- RegistryVersion** : v1_2_00
- SupportedSystems** :
 - 0

Registry Layout

```
{
  "DependencyFor": "BootMode",
  "Type": "Map",
  "Dependency": {
    "MapFrom": [
      {
        "MapFromAttribute": "BootMode",
        "MapFromProperty": "CurrentValue",
        "MapFromCondition": "EQU",
        "MapFromValue": "LegacyBios"
      }
    ],
    "MapToAttribute": "UefiOptimizedBoot",
    "MapToProperty": "CurrentValue",
    "MapToValue": "Disabled"
  }
}
```

Dependency



Bios Attribute Registry

```
306
  AttributeName : TpmType
  DisplayName : Current TPM Type
  HelpText : Current TPM device type.
  ReadOnly : true
  GrayOut : false
  Immutable : true
  Type : Enumeration
  MenuPath : ./ServerSecurity/TpmOptions
  DisplayOrder : 307
  CurrentValue : null
  Value :
    0
      ValueName : NoTpm
      ValueDisplayName : No TPM
    1
      ValueName : Tpm12
      ValueDisplayName : TPM 1.2
    2
      ValueName : Tpm20
      ValueDisplayName : TPM 2.0
```

An Attribute Field

```
  DisplayName : Serial Port Options
  DisplayOrder : 4
  GrayOut : false
  MenuName : SerialPortOptions
  MenuPath : ./SystemOptions/SerialPortOptions
```

Menu



Updating a BIOS Setting Example

- Example Curl code to change “AdminName”

```
{  
  "Attributes": {  
    "AdminName": "New Name"  
  }  
}
```

```
curl -H "Content-Type: application/json" -X PATCH --data @name.json https://IP/redfish/v1/Systems/1/bios/settings/ -u user:psw
```

- The “AdminName” Property will change to “New Name”



Using Actions in BIOS Example

- Example Curl code to reset Bios settings:

POST URI: `redfish/v1/Systems/1/Bios/Settings/Actions/Bios.ResetBios/`

```
{  
  "ResetType": "default"  
}
```

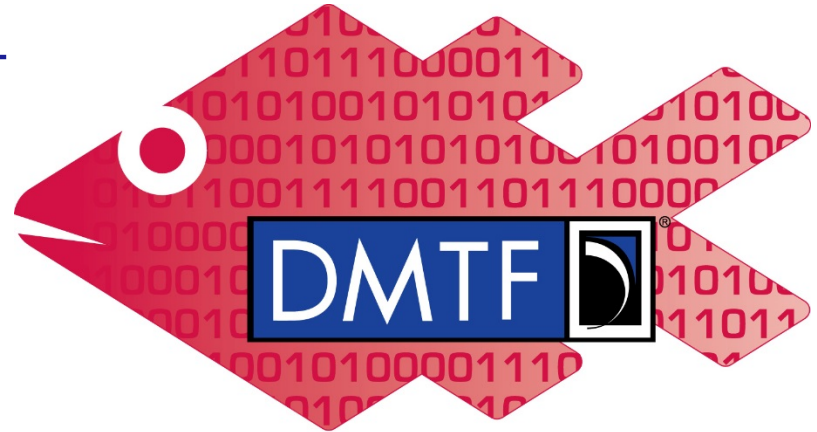
```
curl -H "Content-Type: application/json" POST --data @Action.json https://IP/redfish/v1/systems/1/bios/settings/Actions/Bios.ResetBios/ -u user:psw
```

- This Action will restore all the Bios system settings to default



Thank you for watching!

- **Redfish Specification Forum**
 - Public forum to post questions on Redfish and Swordfish
 - <https://redfishforum.com>
- **Redfish Standards**
 - Schemas, Specs, Mockups, White Papers, FAQ, Educational Material & more
 - <http://www.dmtf.org/standards/redfish>
- **Redfish Developer Portal**
 - Redfish Interactive Explorer, Hosted Schema at Namespace & other links
 - <http://redfish.dmtf.org>
- **DMTF Redfish Forum**
 - DMTF working group which defines Redfish
 - Companies involved, upcoming schedules, future work, charter, and how to join
 - <http://www.dmtf.org/standards/spmf>



Redfish