BIOS Configuration

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HPE
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

- **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.
Example of a BIOS Resource

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BIOS Current Settings

```json
{
    "@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

```json
{
    "@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

  o GET /redfish/v1/systems/1/bios/
    AdminName : Fox

  o GET /redfish/v1/systems/1/bios/settings/
    AdminName : Dana
Example: Getting the Boot Mode

```python
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": []  }}
```

Dependency

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

#### Attribute Field

- **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

#### Menu

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

---

An Attribute Field
Updating a BIOS Setting Example

• Example Curl code to change “AdminName”

```json
{
   "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/

  ```json
  
  "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](https://redfishforum.com)

- **Redfish Standards**
  - Schemas, Specs, Mockups, White Papers, FAQ, Educational Material & more
  - [http://www.dmtf.org/standards/redfish](http://www.dmtf.org/standards/redfish)

- **Redfish Developer Portal**
  - Redfish Interactive Explorer, Hosted Schema at Namespace & other links
  - [http://redfish.dmtf.org](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](http://www.dmtf.org/standards/spmf)