Document Identifier: DSP2064

Date: 2023-05-12

Version: 1.0.0

Redfish for Thermal Equipment

Supersedes: 0.95WIP95

Document Class: Informational

Document Status: Published

Document Language: en-US

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1 Foreword

This white paper covers Redfish schema support for managing cooling distribution equipment and infrastructure. This includes liquid cooling distribution units, immersion cooling units, heat exchangers, and facility cooling loops.

The Redfish standard has expanded its coverage of data center components, having started with server management and added storage systems, networking and fabric support. As this provides a consistent protocol and data model for managing the bulk of the IT equipment in a data center, it was natural to further extend the data model to include cooling systems, power distribution and other facility services. This allows the utilization of a common set of tools to manage the entire infrastructure, and enable development of tools that can integrate data across the various subsystems to optimize resource utilization.

1.1 Where can I find more information?

The following web sites provide more information about the Redfish standard:

- **Redfish Developer Hub:** http://redfish.dmtf.org Resources for developers building applications using Redfish. Contains an interactive schema explorer, hosted schema and other links.
- **Redfish User Forum:** http://www.redfishforum.com User forum monitored by DMTF Redfish personnel to answer questions about any Redfish-related topics:
- **DMTF Github Repositories:** http://www.github.com/DMTF Open source tools and libraries for working with the Redfish API.
- **Redfish Standards:** http://www.dmtf.org/standards/redfish Schemas, specs, mockups, white papers, FAQ, educational material and more.
- **DMTF Redfish Forum** (Working group that maintains the Redfish standard): http://www.dmtf.org/standards/spmf Companies involved, upcoming schedules and future work, charter, and information about joining.

1.2 Using the reference guide

The cooling distribution-related schemas are listed in the following section for reference. This section should be considered an extension to the contents of DSP2046, the Redfish Resource and Schema Guide, which lists the common Redfish properties, other object definitions, and all released Redfish schemas (including those shown here).

This guide was produced using the contents of the schema files from DMTF Redfish Schema bundle DSP8010 and merged with supplemental text using the DMTF's Redfish Documentation Generator.

1.3 Common Properties

Properties and objects defined for all Redfish schemas, or referenced by this white paper are detailed in the Redfish Resource and Schema Guide (DSP2046), available for download at the Redfish Standards site: http://www.dmtf.org/standards/redfish

2 Central data model concepts

The Redfish data models for air and liquid cooling distribution equipment are heavily leveraged from previous work to model power distribution in the data center. As the management and control of cooling equipment follows similar use cases to data center power infrastructure, many of the concepts developed, including the Facility, Sensor, and Control models, apply directly to this class of equipment.

2.1 Chassis

To keep the data model consistent across devices managed via Redfish, it is expected that most products will include at least one Chassis resource, to describe the physical product or container. This is important to show the "contains" and "contained by" relationships among components, especially when attempting to model a full cooling domain.

The recommendation to always include a Chassis resource is a change from the guidance given when the PowerDistribution model was released. At the time, it was deemed duplicative with the functional model provided by the `PowerDistribution` schema. But as those model matured, it has become clear that the pure physical model view provided by a `Chassis` resource is needed to ensure client software can, for example, discover all of the equipment contained within a rack. This becomes vital for immersion cooling systems, where `ComputerSystem` units and their associated `Chassis` are contained within the immersion tank. A new `ChassisType` value of "ImmersionTank" has also been added for this reason.

2.2 Facility

One of the basic model constructs for Redfish is the presentation of both a "Functional" and a "Physical" view of the managed systems or devices. For Computer Systems (servers) this results in resources for both a `ComputerSystem` (functional view) and a `Chassis` (physical view). The chassis model works well for equipment that is "contained within a sheet metal box", but the terminology and concept becomes confusing when describing equipment placed in a room.

This was addressed by the addition of the `Facility` schema to describe a room or other physical location that can contain equipment and likely has relationships to other facilities. Many of the concepts from the `Chassis` schema were applied to `Facility`, including the ability to nest facilities (e.g., a Room is contained by a Floor or Building).

Some equipment may be truly contained by a room, rather than a chassis, and so the data model allows some equipment, including `CoolingLoop`, to be contained directly by a `Facility`.

3 Thermal Equipment resource tree

Below is a diagram of the resource tree, starting at the Redfish Service Root, containing all resources used to model a rack-based Cooling Distribution Unit (CDU). Other types of cooling systems, such as immersion cooling units, follow the same model. The individual resources are detailed in the following sections.

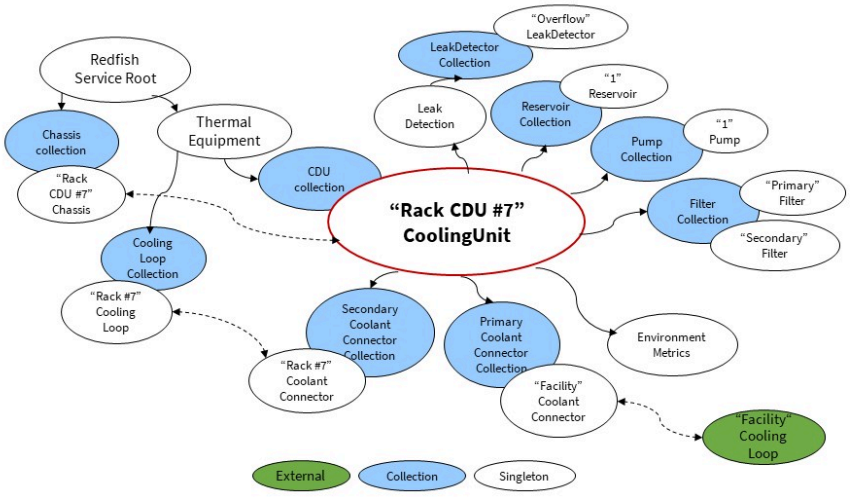

Figure 1: Resource Tree for Thermal Equipment

3.1 Thermal Equipment

A new resource, linked from the Service Root, was added to contain all links to cooling equipment and any future properties that may relate to cooling, heating, or environmental systems in general. The `ThermalEquipment` resource can be used to quickly determine the types of equipment supported by the Service. It also allows for future additions to the schema without requiring changes to the `ServiceRoot` schema.

3.2 Cooling Unit

The main resource for describing a cooling system component is the `CoolingUnit` schema and resource. As various types of cooling distribution gear follow a very similar model (cooling loop connections, temperature and pressure measurements, and general product identification), these are all modeled using a single schema. This schema is then used to populate a number of Resource Collections, grouped by the type of equipment, but all sharing the same schema definition.

There are separate Resource Collections under `ThermalEquipment` for Cooling Distribution Units (CDUs) and Immersion Cooling units. These collections are intended to allow similar gear to be grouped together to match common management use cases.

For each cooling unit instance, there are a number of subordinate resources and resource collections that describe the various components, connections, and subsystems that may be present.

3.3 Cooling Loops

Large-scale cooling equipment are generally connected through "loops", which can describe either a primary or facility level system (e.g. chilled water loop) or a secondary or "technology" loop that services the IT equipment in a single rack. These are modeled by a `CoolingLoop` resource, which contains both product information and shows the connections (as links to other resources) to and from the loop. Besides providing the basic inventory functions, this resource is intended to enable software to follow the flow of coolant through its entire cycle in a facility-level cooling system.

3.4 Coolant Connectors

The primary monitoring points within a cooling system are at the supply and return connections for a particular piece of equipment. These are treated similar to a `Circuit` or `Outlet` in a power distribution system. A `CoolantConnector` can model both a supply and return in a single resource instance, as in general, a user is concerned with the change in coolant condition, so providing measurements for both is efficient for client software.

4 Schema Guide

4.1 Chassis 1.23.0

Version	*v1.23*	*v1.22*	*v1.21*	*v1.20*	*v1.19*	*v1.18*	*v1.17*	*v1.16*	*v1.15*	*v1.14*	*v1.13*	...
Release	2023.1	2022.3	2022.2	2022.1	2021.4	2021.3	2021.2	2021.1	2020.4	2020.3	2020.2	...

4.1.1 Description

The Chassis schema represents the physical components of a system. This resource represents the sheet-metal confined spaces and logical zones such as racks, enclosures, chassis and all other containers. Subsystems, such as sensors, that operate outside of a system's data plane are linked either directly or indirectly through this resource. A subsystem that operates outside of a system's data plane are not accessible to software that runs on the system. It also describes the location, such as a slot, socket, or bay, where a unit can be installed, by populating a resource instance with an absent state if a unit is not present.

4.1.2 URIs

/redfish/v1/Chassis/*{ChassisId}*

4.1.3 Properties

Property	Type	Attributes	Notes
Assembly *(v1.6+)* {}	object		The link to the assembly associated with this chassis. See the *Assembly* schema for details on this property.
AssetTag	string	*read-write (null)*	The user-assigned asset tag of this chassis.
Certificates *(v1.15+)* {	object		The link to a collection of certificates for device identity and attestation. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Certificate*. See the Certificate schema for details.

Property	Type	Attributes	Notes
}			
ChassisType	string (enum)	*read-only required*	The type of physical form factor of the chassis. *For the possible property values, see ChassisType in Property details.*
Controls *(v1.17+)* {	object		The link to the collection of controls located in this chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Control*. See the Control schema for details.
}			
DepthMm *(v1.4+)*	number (mm)	*read-only (null)*	The depth of the chassis.
Drives *(v1.14+)* {	object		The link to the collection of drives within this chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Drive*. See the Drive schema for details.
}			
ElectricalSourceManagerURIs *(v1.18+)* [ ]	array (URI) (string, null)	*read-write*	The URIs of the management interfaces for the upstream electrical source connections for this chassis.
ElectricalSourceNames *(v1.18+)* [ ]	array (string, null)	*read-write*	The names of the upstream electrical sources, such as circuits or outlets, connected to this chassis.
EnvironmentalClass *(v1.9+)*	string (enum)	*read-write (null)*	The ASHRAE Environmental Class for this chassis. *For the possible property values, see EnvironmentalClass in Property details.*
EnvironmentMetrics *(v1.15+)* {	object		The link to the environment metrics for this chassis. See the *EnvironmentMetrics* schema for details on this property.
@odata.id	string	*read-only*	Link to a EnvironmentMetrics resource. See the Links section and the *EnvironmentMetrics* schema for details.
}			
FabricAdapters *(v1.20+)* {	object		The link to the collection of fabric adapters located in this chassis that provide access to fabric-related resource pools. Contains a link to a resource.

Property	Type	Attributes	Notes
@odata.id	string	*read-only*	Link to Collection of *FabricAdapter*. See the FabricAdapter schema for details.
}			
HeightMm *(v1.4+)*	number (mm)	*read-only (null)*	The height of the chassis.
HotPluggable *(v1.21+)*	boolean	*read-only (null)*	An indication of whether this component can be inserted or removed while the equipment is in operation.
IndicatorLED *(deprecated v1.14)*	string (enum)	*read-write (null)*	The state of the indicator LED, which identifies the chassis. *For the possible property values, see IndicatorLED in Property details. Deprecated in v1.14 and later. This property has been deprecated in favor of the LocationIndicatorActive property.*
Links {	object		The links to other resources that are related to this resource.
Cables *(v1.17+)* [{ }]	array (object)		An array of links to the cables connected to this chassis. See the *Cable* schema for details on this property.
Cables@odata.count	integer	*read-only*	The number of items in a collection.
ComputerSystems [{ }]	array (object)		An array of links to the computer systems that this chassis directly and wholly contains. See the *ComputerSystem* schema for details on this property.
ComputerSystems@odata.count	integer	*read-only*	The number of items in a collection.
ConnectedCoolingLoops *(v1.23+)* [{	array		An array of links to cooling loops connected to this chassis.
@odata.id	string	*read-write*	Link to a CoolingLoop resource. See the Links section and the *CoolingLoop* schema for details.
}]			
ConnectedCoolingLoops@odata.count	integer	*read-only*	The number of items in a collection.
ContainedBy {	object		The link to the chassis that contains this chassis.
@odata.id	string	*read-write*	Link to another Chassis resource.
}			
Contains [{	array		An array of links to any other chassis that this chassis has in it.

Property	Type	Attributes	Notes
@odata.id	string	*read-write*	Link to another Chassis resource.
}]			
Contains@odata.count	integer	*read-only*	The number of items in a collection.
CooledBy *(deprecated v1.20)* [{	array		An array of links to resources or objects that cool this chassis. Normally, the link is for either a chassis or a specific set of fans. *Deprecated in v1.20 and later. This property has been deprecated in favor of the Fans link property, and details provided in the ThermalSubsystem resource.*
@odata.id	string (URI)	*read-only*	The unique identifier for a resource.
}]			
CooledBy@odata.count	integer	*read-only*	The number of items in a collection.
CoolingUnits *(v1.23+)* [{	array		An arrays of links to cooling unit functionality contained in this chassis.
@odata.id	string	*read-write*	Link to a CoolingUnit resource. See the Links section and the *CoolingUnit* schema for details.
}]			
CoolingUnits@odata.count	integer	*read-only*	The number of items in a collection.
Drives *(v1.2+)* [{ }]	array (object)		An array of links to the drives located in this chassis. See the *Drive* schema for details on this property.
Drives@odata.count	integer	*read-only*	The number of items in a collection.
Facility *(v1.11+)* {	object		The link to the facility that contains this chassis. See the *Facility* schema for details on this property.
@odata.id	string	*read-write*	Link to a Facility resource. See the Links section and the *Facility* schema for details.
}			
Fans *(v1.20+)* [{ }]	array (object)		An array of links to the fans that cool this chassis. See the *Fan* schema for details on this property.
Fans@odata.count	integer	*read-only*	The number of items in a collection.
ManagedBy [{ }]	array (object)		An array of links to the managers responsible for managing this chassis. See the *Manager* schema for details on this property.

Property	Type	Attributes	Notes
ManagedBy@odata.count	integer	*read-only*	The number of items in a collection.
ManagersInChassis *(v1.2+)* [{ }]	array (object)		An array of links to the managers located in this chassis. See the *Manager* schema for details on this property.
ManagersInChassis@odata.count	integer	*read-only*	The number of items in a collection.
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.
PCIeDevices *(v1.4+, deprecated v1.10* [{ }]	array (object)		An array of links to the PCIe devices located in this chassis. See the *PCIeDevice* schema for details on this property. *Deprecated in v1.10 and later. This property has been deprecated in favor of the PCIeDevices resource collection in the root of this resource.*
PCIeDevices@odata.count	integer	*read-only*	The number of items in a collection.
PowerDistribution *(v1.20+)* {}	object	*(null)*	A link to power distribution functionality contained in this chassis. See the *PowerDistribution* schema for details on this property.
PowerOutlets *(v1.18+)* [{ }]	array (object)		An array of links to the outlets that provide power to this chassis. See the *Outlet* schema for details on this property.
PowerOutlets@odata.count	integer	*read-only*	The number of items in a collection.
PowerSupplies *(v1.20+)* [{ }]	array (object)		An array of links to the power supplies that provide power to this chassis. See the *PowerSupply* schema for details on this property.
PowerSupplies@odata.count	integer	*read-only*	The number of items in a collection.
PoweredBy *(deprecated v1.20)* [{	array		An array of links to resources or objects that power this chassis. Normally, the link is for either a chassis or a specific set of power supplies. *Deprecated in v1.20 and later. This property has been deprecated in favor of the PowerOutlets and PowerSupplies link properties, and details provided in the PowerSubsystem resource.*
@odata.id	string (URI)	*read-only*	The unique identifier for a resource.
}]			
PoweredBy@odata.count	integer	*read-only*	The number of items in a collection.

Property	Type	Attributes	Notes
Processors *(v1.9+)* [{ }]	array (object)		An array of links to the processors located in this chassis. See the *Processor* schema for details on this property.
Processors@odata.count	integer	*read-only*	The number of items in a collection.
ResourceBlocks *(v1.5+)* [{ }]	array (object)		An array of links to the resource blocks located in this chassis. See the *ResourceBlock* schema for details on this property.
ResourceBlocks@odata.count	integer	*read-only*	The number of items in a collection.
Storage *(v1.2+)* [{ }]	array (object)		An array of links to the storage subsystems connected to or inside this chassis. See the *Storage* schema for details on this property.
Storage@odata.count	integer	*read-only*	The number of items in a collection.
Switches *(v1.7+)* [{ }]	array (object)		An array of links to the switches located in this chassis. See the *Switch* schema for details on this property.
Switches@odata.count	integer	*read-only*	The number of items in a collection.
}			
Location *(v1.2+)* {}	object		The location of the chassis. See the *Resource* schema for details on this property.
LocationIndicatorActive *(v1.14+)*	boolean	*read-write (null)*	An indicator allowing an operator to physically locate this resource.
LogServices {	object		The link to the logs for this chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *LogService*. See the LogService schema for details.
}			
Manufacturer	string	*read-only (null)*	The manufacturer of this chassis.
MaxPowerWatts *(v1.12+)*	number (Watts)	*read-only (null)*	The upper bound of the total power consumed by the chassis.
Measurements *(v1.15+, deprecated v1.19* [{ }]	array (object)		An array of DSP0274-defined measurement blocks. See the *SoftwareInventory* schema for details on this property. *Deprecated in v1.19 and later. This property has been deprecated in favor of the ComponentIntegrity resource.*

Property	Type	Attributes	Notes
MediaControllers *(v1.11+, deprecated v1.20* {	object		The link to the collection of media controllers located in this chassis. Contains a link to a resource. *Deprecated in v1.20 and later. This property has been deprecated in favor of FabricAdapters.*
@odata.id	string	*read-only*	Link to Collection of *MediaController*. See the MediaController schema for details.
}			
Memory *(v1.11+)* {	object		The link to the collection of memory located in this chassis that belong to fabric-related resource pools. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Memory*. See the Memory schema for details.
}			
MemoryDomains *(v1.11+)* {	object		The link to the collection of memory domains located in this chassis that belong to fabric-related resource pools. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *MemoryDomain*. See the MemoryDomain schema for details.
}			
MinPowerWatts *(v1.12+)*	number (Watts)	*read-only (null)*	The lower bound of the total power consumed by the chassis.
Model	string	*read-only (null)*	The model number of the chassis.
NetworkAdapters *(v1.4+)* {	object		The link to the collection of network adapters associated with this chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *NetworkAdapter*. See the NetworkAdapter schema for details.
}			
PartNumber	string	*read-only (null)*	The part number of the chassis.
PCIeDevices *(v1.10+)* {	object		The link to the collection of PCIe devices located in this chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *PCIeDevice*. See the PCIeDevice schema for details.

Property	Type	Attributes	Notes
}			
PCIeSlots *(v1.8+)* {}	object		The link to the PCIe slot properties for this chassis. See the *PCIeSlots* schema for details on this property.
PhysicalSecurity *(v1.1+)* {	object		The physical security state of the chassis.
IntrusionSensor *(v1.1+)*	string (enum)	*read-write (null)*	The physical security state of the chassis, such as if hardware intrusion is detected. *For the possible property values, see IntrusionSensor in Property details.*
IntrusionSensorNumber *(v1.1+, deprecated v1.22*	integer	*read-only (null)*	A numerical identifier to represent the physical security sensor. *Deprecated in v1.22 and later. This property has been deprecated in order to allow for multiple physical sensors to construct this object.*
IntrusionSensorReArm *(v1.1+)*	string (enum)	*read-only (null)*	The policy that describes how the physical security state of the chassis returns to a normal state. *For the possible property values, see IntrusionSensorReArm in Property details.*
}			
Power *(deprecated v1.15)* {}	object		The link to the power properties, or power supplies, power policies, and sensors, for this chassis. See the *Power* schema for details on this property. *Deprecated in v1.15 and later. This link has been deprecated in favor of the PowerSubsystem link property.*
PoweredByParent *(v1.20+)*	boolean	*read-only (null)*	Indicates that the chassis receives power from the containing chassis.
PowerState *(v1.0.1+)*	string (enum)	*read-only (null)*	The current power state of the chassis. *For the possible property values, see PowerState in Property details.*
PowerSubsystem *(v1.15+)* {}	object		The link to the power subsystem properties for this chassis. See the *PowerSubsystem* schema for details on this property.
Processors *(v1.22+)* {	object		The link to the collection of processors located in this chassis that belong to fabric-related resource pools. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Processor*. See the Processor schema for details.
}			

Property	Type	Attributes	Notes
Replaceable *(v1.21+)*	boolean	*read-only (null)*	An indication of whether this component can be independently replaced as allowed by the vendor's replacement policy.
Sensors *(v1.9+)* {	object		The link to the collection of sensors located in the equipment and sub-components. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Sensor*. See the Sensor schema for details.
}			
SerialNumber	string	*read-only (null)*	The serial number of the chassis.
SKU	string	*read-only (null)*	The SKU of the chassis.
SparePartNumber *(v1.16+)*	string	*read-only (null)*	The spare part number of the chassis.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
Thermal *(deprecated v1.15)* {}	object		The link to the thermal properties, such as fans, cooling, and sensors, for this chassis. See the *Thermal* schema for details on this property. *Deprecated in v1.15 and later. This link has been deprecated in favor of the ThermalSubsystem link property.*
ThermalDirection *(v1.20+)*	string (enum)	*read-only (null)*	Indicates the thermal management path through the chassis. *For the possible property values, see ThermalDirection in Property details.*
ThermalManagedByParent *(v1.20+)*	boolean	*read-only (null)*	Indicates that the chassis is thermally managed by the parent chassis.
ThermalSubsystem *(v1.15+)* {	object		The link to the thermal subsystem properties for this chassis. See the *ThermalSubsystem* schema for details on this property.
@odata.id	string	*read-only*	Link to a ThermalSubsystem resource. See the Links section and the *ThermalSubsystem* schema for details.
}			

Property	Type	Attributes	Notes
TrustedComponents *(v1.21+)* {	object		The link to the trusted components in this chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *TrustedComponent*. See the TrustedComponent schema for details.
}			
UUID *(v1.7+)*	string (uuid)	*read-only (null)*	The UUID for this chassis.
Version *(v1.21+)*	string	*read-only (null)*	The hardware version of this chassis.
WeightKg *(v1.4+)*	number (kg)	*read-only (null)*	The weight of the chassis.
WidthMm *(v1.4+)*	number (mm)	*read-only (null)*	The width of the chassis.

4.1.4 Actions

4.1.4.1 Reset

Description

This action resets the chassis. Additionally, it could reset systems or other contained resources depending on the ResetType used to invoke this action.

Action URI

{Base URI of target resource}/Actions/Chassis.Reset

Action parameters

Parameter Name	Type	Attributes	Notes
ResetType	string (enum)	*optional*	The type of reset. *For the possible property values, see ResetType in Property details.*

Request Example

```
{
    "ResetType": "ForceRestart"
}
```

4.1.5 Property details

4.1.5.1 ChassisType

The type of physical form factor of the chassis.

string	Description
Blade	An enclosed or semi-enclosed, typically vertically-oriented, system chassis that must be plugged into a multi-system chassis to function normally.
Card	A loose device or circuit board intended to be installed in a system or other enclosure.
Cartridge	A small self-contained system intended to be plugged into a multi-system chassis.
Component	A small chassis, card, or device that contains devices for a particular subsystem or function.
Drawer	An enclosed or semi-enclosed, typically horizontally-oriented, system chassis that can be slid into a multi-system chassis.
Enclosure	A generic term for a chassis that does not fit any other description.
Expansion	A chassis that expands the capabilities or capacity of another chassis.
HeatExchanger *(v1.23+)*	A heat exchanger.
ImmersionTank *(v1.23+)*	An immersion cooling tank.
IPBasedDrive *(v1.3+)*	A chassis in a drive form factor with IP-based network connections.
Module	A small, typically removable, chassis or card that contains devices for a particular subsystem or function.
Other	A chassis that does not fit any of these definitions.
Pod	A collection of equipment racks in a large, likely transportable, container.
Rack	An equipment rack, typically a 19-inch wide freestanding unit.
RackGroup *(v1.4+)*	A group of racks that form a single entity or share infrastructure.
RackMount	A single-system chassis designed specifically for mounting in an equipment rack.
Row	A collection of equipment racks.

string	Description
Shelf	An enclosed or semi-enclosed, typically horizontally-oriented, system chassis that must be plugged into a multi-system chassis to function normally.
Sidecar	A chassis that mates mechanically with another chassis to expand its capabilities or capacity.
Sled	An enclosed or semi-enclosed, system chassis that must be plugged into a multi-system chassis to function normally similar to a blade type chassis.
StandAlone	A single, free-standing system, commonly called a tower or desktop chassis.
StorageEnclosure *(v1.6+)*	A chassis that encloses storage.
Zone	A logical division or portion of a physical chassis that contains multiple devices or systems that cannot be physically separated.

4.1.5.2 EnvironmentalClass

The ASHRAE Environmental Class for this chassis.

string	Description
A1	ASHRAE Environmental Class 'A1'.
A2	ASHRAE Environmental Class 'A2'.
A3	ASHRAE Environmental Class 'A3'.
A4	ASHRAE Environmental Class 'A4'.

4.1.5.3 IndicatorLED

The state of the indicator LED, which identifies the chassis.

string	Description
Blinking	The indicator LED is blinking.
Lit	The indicator LED is lit.
Off	The indicator LED is off.
Unknown *(deprecated v1.2)*	The state of the indicator LED cannot be determined. *Deprecated in v1.2 and later. This value has been deprecated in favor of returning null if the state is unknown.*

4.1.5.4 IntrusionSensor

The physical security state of the chassis, such as if hardware intrusion is detected.

string	Description
HardwareIntrusion	A door, lock, or other mechanism protecting the internal system hardware from being accessed is detected to be in an insecure state.
Normal	No physical security condition is detected at this time.
TamperingDetected	Physical tampering of the monitored entity is detected.

4.1.5.5 IntrusionSensorReArm

The policy that describes how the physical security state of the chassis returns to a normal state.

string	Description
Automatic	The sensor is automatically restored to the normal state when no security condition is detected.
Manual	A user is required to clear the sensor to restore it to the normal state.

4.1.5.6 PowerState

The current power state of the chassis.

string	Description
Off	The resource is powered off. The components within the resource might continue to have AUX power.
On	The resource is powered on.
Paused	The resource is paused.
PoweringOff	A temporary state between on and off. The components within the resource can take time to process the power off action.
PoweringOn	A temporary state between off and on. The components within the resource can take time to process the power on action.

4.1.5.7 ResetType

The type of reset.

string	Description
ForceOff	Turn off the unit immediately (non-graceful shutdown).
ForceOn	Turn on the unit immediately.
ForceRestart	Shut down immediately and non-gracefully and restart the system.
GracefulRestart	Shut down gracefully and restart the system.
GracefulShutdown	Shut down gracefully and power off.
Nmi	Generate a diagnostic interrupt, which is usually an NMI on x86 systems, to stop normal operations, complete diagnostic actions, and, typically, halt the system.
On	Turn on the unit.
Pause	Pause execution on the unit but do not remove power. This is typically a feature of virtual machine hypervisors.
PowerCycle	Power cycle the unit. Behaves like a full power removal, followed by a power restore to the resource.
PushPowerButton	Simulate the pressing of the physical power button on this unit.
Resume	Resume execution on the paused unit. This is typically a feature of virtual machine hypervisors.
Suspend	Write the state of the unit to disk before powering off. This allows for the state to be restored when powered back on.

4.1.5.8 ThermalDirection

Indicates the thermal management path through the chassis.

string	Description
BackToFront	A chassis with the air intake in the back and exhaust out the front.
FrontToBack	A chassis with the air intake in the front and exhaust out the back.
Sealed	A sealed chassis with no air pathway.
TopExhaust	A chassis with air exhaust on the top.

4.1.6 Example response


```
{
    "@odata.type": "#Chassis.v1_22_0.Chassis",
    "Id": "1U",
    "Name": "Computer System Chassis",
    "ChassisType": "RackMount",
    "AssetTag": "Chicago-45Z-2381",
    "Manufacturer": "Contoso",
    "Model": "3500RX",
    "SKU": "8675309",
    "SerialNumber": "437XR1138R2",
    "PartNumber": "224071-J23",
    "PowerState": "On",
    "LocationIndicatorActive": true,
    "Location": {
        "Placement": {
            "Row": "North",
            "Rack": "WEB43",
            "RackOffsetUnits": "EIA_310",
            "RackOffset": 12
        }
    },
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "HeightMm": 44.45,
    "WidthMm": 431.8,
    "DepthMm": 711,
    "WeightKg": 15.31,
    "EnvironmentalClass": "A3",
    "Sensors": {
        "@odata.id": "/redfish/v1/Chassis/1U/Sensors"
    },
    "PowerSubsystem": {
        "@odata.id": "/redfish/v1/Chassis/1U/PowerSubsystem"
    },
    "ThermalSubsystem": {
        "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem"
    },
    "EnvironmentMetrics": {
        "@odata.id": "/redfish/v1/Chassis/1U/EnvironmentMetrics"
    },
    "Links": {
        "ComputerSystems": [
            {
                "@odata.id": "/redfish/v1/Systems/437XR1138R2"
            }
```

```
        ],
        "ManagedBy": [
            {
                "@odata.id": "/redfish/v1/Managers/BMC"
            }
        ],
        "ManagersInChassis": [
            {
                "@odata.id": "/redfish/v1/Managers/BMC"
            }
        ]
    },
    "@odata.id": "/redfish/v1/Chassis/1U"
}
```


4.2 CoolantConnector 1.0.0

Version	*v1.0*
Release	2023.1

4.2.1 Description

This schema describes a liquid coolant connector, including any associated instrumentation.

4.2.2 URIs

/redfish/v1/Chassis/*{ChassisId}*/ThermalSubsystem/CoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/PrimaryCoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/SecondaryCoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/CoolingLoops/*{CoolingUnitId}*/PrimaryCoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/CoolingLoops/*{CoolingUnitId}*/SecondaryCoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/PrimaryCoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/SecondaryCoolantConnectors/*{CoolantConnectorId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/PrimaryCoolantConnectors/

{CoolantConnectorId}
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/SecondaryCoolantConnectors/*{CoolantConnectorId}*

4.2.3 Properties

Property	Type	Attributes	Notes
Coolant {	object		Details about the coolant used in this unit. See the *CoolingLoop* schema for details on this property.
@odata.id	string	*read-only*	Link to a Coolant resource. See the Links section and the *CoolingLoop* schema for details.
}			
CoolantConnectorType	string (enum)	*read-only* *(null)*	The type of coolant connector. *For the possible property values, see CoolantConnectorType in Property details.*
CoolingLoopName	string	*read-write* *(null)*	The name of the cooling loop attached to this interface.
CoolingManagerURI	string (URI)	*read-write* *(null)*	The link to the application that manages the cooling loop.
DeltaPressurekPa {}	object		The differential pressure (kPa). For more information about this property, see SensorExcerpt in Property Details.
DeltaTemperatureCelsius {}	object		The differential temperature (C). For more information about this property, see SensorExcerpt in Property Details.
FlowLitersPerMinute {}	object		The liquid flow (L/min). For more information about this property, see SensorExcerpt in Property Details.
HeatRemovedkW {}	object		The heat removed (kW) through this connector. For more information about this property, see SensorExcerpt in Property Details.
Links {	object		The links to other resources that are related to this resource.
ConnectedChassis [{	array		Any array of links to chassis at the other end of the connection.
@odata.id	string	*read-write*	Link to a Chassis resource. See the Links section and the *Chassis* schema for details.
}]			
ConnectedChassis@odata.count	integer	*read-only*	The number of items in a collection.

Property	Type	Attributes	Notes
ConnectedCoolingLoop {	object	*(null)*	A link to the cooling loop at the other end of the connection. See the *CoolingLoop* schema for details on this property.
@odata.id	string	*read-write*	Link to a CoolingLoop resource. See the Links section and the *CoolingLoop* schema for details.
}			
ConnectedCoolingUnit {	object	*(null)*	A link to the cooling unit at the other end of the connection. See the *CoolingUnit* schema for details on this property.
@odata.id	string	*read-write*	Link to a CoolingUnit resource. See the Links section and the *CoolingUnit* schema for details.
}			
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.
}			
LocationIndicatorActive	boolean	*read-write* *(null)*	An indicator allowing an operator to physically locate this resource.
RatedFlowLitersPerMinute	number (L/min)	*read-only* *(null)*	The rated liquid flow (L/min) for this loop interface.
RatedFlowPressurekPa	number (kPa)	*read-only* *(null)*	The pressure (kPa) at which the rated liquid flow is valid.
RatedPressurekPa	number (kPa)	*read-only* *(null)*	The rated pressure (kPa) for this connector.
ReturnPressurekPa {}	object		The return pressure (kPa). For more information about this property, see SensorExcerpt in Property Details.
ReturnTemperatureCelsius {}	object		The return temperature (C). For more information about this property, see SensorExcerpt in Property Details.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
SupplyPressurekPa {}	object		The supply pressure (kPa). For more information about this property, see SensorExcerpt in Property Details.
SupplyTemperatureCelsius {}	object		The supply temperature (C). For more information about this property, see SensorExcerpt in Property Details.

4.2.4 Property details

4.2.4.1 CoolantConnectorType

The type of coolant connector.

string	Description
Closed	A closed or self-contained loop.
Inline	An inline connection or measurement point.
Pair	A connection pair.
Return	A return or outflow connection.
Supply	A supply or intake connection.

4.2.4.2 SensorExcerpt

The Sensor schema describes a sensor and its properties. This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.

DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
Reading	number	*read-only (null)*	The sensor value.

4.2.5 Example response


```
{
    "@odata.type": "#CoolantConnector.v1_0_0.CoolantConnector",
    "Id": "A",
    "Name": "Rack Cooling Loop A",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "CoolantConnectorType": "Pair",
    "RatedFlowLitersPerMinute": 30,
```

```
    "FlowLitersPerMinute": {
        "Reading": 24.3
    },
    "SupplyTemperatureCelsius": {
        "Reading": 14.8
    },
    "ReturnTemperatureCelsius": {
        "Reading": 38.2
    },
    "DeltaTemperatureCelsius": {
        "Reading": 23.4
    },
    "SupplyPressurekPa": {
        "Reading": 426.6
    },
    "ReturnPressurekPa": {
        "Reading": 409.9
    },
    "DeltaPressurekPa": {
        "Reading": 31.7
    },
    "Links": {
        "ConnectedCoolingLoop": {
            "@odata.id": "/redfish/v1/ThermalEquipment/CoolingLoops/Rack4"
        }
    },
    "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/SecondaryCoolantConnectors/A",
    "@Redfish.Copyright": "Copyright 2014-2020 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.3 CoolingLoop 1.0.0

Version	*v1.0*
Release	2023.1

4.3.1 Description

This schema describes a cooling loop. A cooling loop might be any coolant-carrying vessel, such as facility-level pipe work, an immersion cooling tank, or a manifold. A loop might describe its connectors and instrumentation, but does not generally include active cooling components or subsystems.

4.3.2 URIs

/redfish/v1/ThermalEquipment/CoolingLoops/*{CoolingLoopId}*

4.3.3 Properties

Property	Type	Attributes	Notes
ConsumingEquipmentNames [ ]	array (string, null)	*read-write*	An array of names of downstream devices that receive coolant from this cooling loop.
Coolant {	object		The coolant details for this cooling loop.
AdditiveName	string	*read-write (null)*	The name of the additive.
AdditivePercent	number (%)	*read-write (null)*	The percent additives contained in the coolant.
CoolantType	string (enum)	*read-write (null)*	The type of coolant. *For the possible property values, see CoolantType in Property details.*
DensityKgPerCubicMeter	number (kg/m3)	*read-write (null)*	The density (kg/m^3) of the coolant.
RatedServiceHours	number	*read-write (null)*	The rated hours of service life for this coolant.
ServiceHours	number	*read-write (null)*	The hours of service this coolant has provided.
ServicedDate	string (date-time)	*read-write (null)*	The date the coolant was last serviced.
SpecificHeatkJoulesPerKgK	number (kJ/kg/K)	*read-write (null)*	The specific heat capacity (kJ/(kg*K)) of the coolant.
}			
CoolantLevelPercent {	object (excerpt)		The coolant capacity filled (percent). This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.

Property	Type	Attributes	Notes
Reading	number	*read-only* *(null)*	The sensor value.
}			
CoolantLevelStatus	string (enum)	*read-only* *(null)*	The status of the coolant level in this cooling loop. *For the possible property values, see CoolantLevelStatus in Property details.*
CoolantQuality	string (enum)	*read-only* *(null)*	The quality of the coolant. *For the possible property values, see CoolantQuality in Property details.*
CoolingManagerURI	string (URI)	*read-write* *(null)*	The link to the application that manages the cooling loop.
Links {	object		The links to other resources that are related to this resource.
Chassis {	object	*(null)*	A link to the chassis that contains this equipment. See the *Chassis* schema for details on this property.
@odata.id	string	*read-only*	Link to a Chassis resource. See the Links section and the *Chassis* schema for details.
}			
Facility {	object		A link to the facility that contains this equipment. See the *Facility* schema for details on this property.
@odata.id	string	*read-only*	Link to a Facility resource. See the Links section and the *Facility* schema for details.
}			
ManagedBy [{ }]	array (object)		An array of links to the managers responsible for managing this equipment. See the *Manager* schema for details on this property.
ManagedBy@odata.count	integer	*read-only*	The number of items in a collection.
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.
}			
LocationIndicatorActive	boolean	*read-write* *(null)*	An indicator allowing an operator to physically locate this resource.
PrimaryCoolantConnectors {	object		A link to the primary coolant connectors for this equipment. Contains a link to a resource.

Property	Type	Attributes	Notes
@odata.id	string	*read-only*	Link to Collection of *CoolantConnector*. See the CoolantConnector schema for details.
}			
RatedFlowLitersPerMinute	number (L/min)	*read-only (null)*	The rated liquid flow (L/min) for this cooling loop.
RatedPressurekPa	number (kPa)	*read-only (null)*	The rated pressure (kPa) for this cooling loop.
SecondaryCoolantConnectors {	object		A link to the secondary coolant connectors for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolantConnector*. See the CoolantConnector schema for details.
}			
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
SupplyEquipmentNames [ ]	array (string, null)	*read-write*	An array of names of upstream devices that supply coolant to this cooling loop.
UserLabel	string	*read-write*	A user-assigned label.

4.3.4 Property details

4.3.4.1 CoolantLevelStatus

The status of the coolant level in this cooling loop.

string	Description
Critical	A critical condition requires immediate attention.
OK	Normal.
Warning	A condition requires attention.

4.3.4.2 CoolantQuality

The quality of the coolant.

string	Description
Critical	A critical condition requires immediate attention.
OK	Normal.
Warning	A condition requires attention.

4.3.4.3 CoolantType

The type of coolant.

string	Description
Dielectric	Dielectric fluid.
Fluorocarbon	Fluorocarbon-based.
Hydrocarbon	Hydrocarbon-based.
Water	Water or glycol mixture, including additives.

4.3.5 Example response


```
{
    "@odata.type": "#CoolingLoop.v1_0_0.CoolingLoop",
    "Id": "BuildingChiller",
    "Name": "Feed from building chiller",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "UserLabel": "Building Chiller",
    "Coolant": {
        "CoolantType": "Water",
        "AdditiveName": "Generic cooling water biocide",
        "AdditivePercent": 0
    },
    "CoolantLevelStatus": "OK",
    "CoolantQuality": "OK",
    "CoolantLevelPercent": {
        "Reading": 95
    },
    "SupplyEquipmentNames": ["Chiller"],
    "ConsumingEquipmentNames": ["Rack #1 CDU", "Rack #2 CDU", "Rack #3 CDU", "Rack #4 CDU"],
    "@odata.id": "/redfish/v1/ThermalEquipment/CoolingLoops/BuildingChiller",
```

```
    "@Redfish.Copyright": "Copyright 2014-2022 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.4 CoolingUnit 1.0.0

Version	*v1.0*
Release	2023.1

4.4.1 Description

This is the schema definition for a cooling distribution component or unit, such as a cooling distribution unit (CDU) or a heat exchanger.

4.4.2 URIs

/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*

4.4.3 Properties

Property	Type	Attributes	Notes
Assembly {}	object		The link to the assembly associated with this cooling unit. See the *Assembly* schema for details on this property.
AssetTag	string	*read-write (null)*	The user-assigned asset tag for this equipment.
Coolant {	object		Details about the coolant used in this unit. See the *CoolingLoop* schema for details on this property.
@odata.id	string	*read-only*	Link to a Coolant resource. See the Links section and the *CoolingLoop* schema for details.
}			
CoolingCapacityWatts	integer	*read-only (null)*	The cooling capacity (W) of this equipment.

Property	Type	Attributes	Notes
EnvironmentMetrics {	object		The link to the environment metrics for this equipment. See the *EnvironmentMetrics* schema for details on this property.
@odata.id	string	*read-only*	Link to a EnvironmentMetrics resource. See the Links section and the *EnvironmentMetrics* schema for details.
}			
EquipmentType	string (enum)	*read-only* *required*	The type of equipment this resource represents. *For the possible property values, see EquipmentType in Property details.*
FilterRedundancy [{ }]	array (object)		The redundancy information for the groups of filters in this unit. See the *v1_4_1.v1_4_1* schema for details on this property.
Filters {	object		A link to the filters for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Filter*. See the Filter schema for details.
}			
FirmwareVersion	string	*read-only*	The firmware version of this equipment.
LeakDetection {	object		A link to the leak detection components associated with this equipment. See the *LeakDetection* schema for details on this property.
@odata.id	string	*read-only*	Link to a LeakDetection resource. See the Links section and the *LeakDetection* schema for details.
}			
Links {	object		The links to other resources that are related to this resource.
Chassis [{	array		An array of links to the chassis that contain this equipment.
@odata.id	string	*read-only*	Link to a Chassis resource. See the Links section and the *Chassis* schema for details.
}]			
Chassis@odata.count	integer	*read-only*	The number of items in a collection.
Facility {	object		A link to the facility that contains this equipment. See the *Facility* schema for details on this property.
@odata.id	string	*read-only*	Link to a Facility resource. See the Links section and the *Facility* schema for details.
}			

Property	Type	Attributes	Notes
ManagedBy [{ }]	array (object)		An array of links to the managers responsible for managing this equipment. See the *Manager* schema for details on this property.
ManagedBy@odata.count	integer	*read-only*	The number of items in a collection.
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.
}			
Location {}	object		The location of the equipment. See the *Resource* schema for details on this property.
Manufacturer	string	*read-only* *(null)*	The manufacturer of this equipment.
Model	string	*read-only* *(null)*	The product model number of this equipment.
PartNumber	string	*read-only* *(null)*	The part number for this equipment.
PrimaryCoolantConnectors {	object		A link to the primary coolant connectors for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolantConnector*. See the CoolantConnector schema for details.
}			
ProductionDate	string (date-time)	*read-only* *(null)*	The production or manufacturing date of this equipment.
PumpRedundancy [{ }]	array (object)		The redundancy information for the groups of pumps in this unit. See the *v1_4_1.v1_4_1* schema for details on this property.
Pumps {	object		A link to the pumps for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Pump*. See the Pump schema for details.
}			
Reservoirs {	object		A link to the reservoirs for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Reservoir*. See the Reservoir schema for details.

Property	Type	Attributes	Notes
}			
SecondaryCoolantConnectors {	object		A link to the secondary coolant connectors for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolantConnector*. See the CoolantConnector schema for details.
}			
SerialNumber	string	*read-only* *(null)*	The serial number for this equipment.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
UserLabel	string	*read-write*	A user-assigned label.
Version	string	*read-only* *(null)*	The hardware version of this equipment.

4.4.4 Property details

4.4.4.1 EquipmentType

The type of equipment this resource represents.

string	Description
CDU	A cooling distribution unit.
HeatExchanger	A heat exchanger.
ImmersionUnit	An immersion cooling unit.

4.4.5 Example response

```
{
    "@odata.type": "#CoolingUnit.v1_0_0.CoolingUnit",
    "Id": "1",
    "EquipmentType": "CDU",
    "Name": "Rack #4 Cooling Distribution Unit",
```

```
    "FirmwareVersion": "3.2.0",
    "Version": "1.03b",
    "ProductionDate": "2020-12-24T08:00:00Z",
    "Manufacturer": "Contoso",
    "Model": "BRRR4000",
    "SerialNumber": "29347ZT536",
    "PartNumber": "ICE-9",
    "AssetTag": "PDX5-92381",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "Location": {
        "Placement": {
            "Row": "North 1"
        }
    },
    "PrimaryCoolantConnectors": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/PrimaryCoolantConnectors"
    },
    "SecondaryCoolantConnectors": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/SecondaryCoolantConnectors"
    },
    "Pumps": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/Pumps"
    },
    "Filters": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/Filters"
    },
    "EnvironmentMetrics": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/EnvironmentMetrics"
    },
    "LeakDetection": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/LeakDetection"
    },
    "Links": {
        "Facility": {
            "@odata.id": "/redfish/v1/Facilities/Room237"
        }
    },
    "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1",
    "@Redfish.Copyright": "Copyright 2014-2021 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.5 EnvironmentMetrics 1.3.0

Version	*v1.3*	*v1.2*	*v1.1*	*v1.0*

Release	2022.2	2021.4	2021.2	2020.4

4.5.1 Description

The EnvironmentMetrics schema represents the environmental metrics of a device.

4.5.2 URIs

/redfish/v1/Chassis/*{ChassisId}*/Drives/*{DriveId}*/EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/FabricAdapters/*{FabricAdapterId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/MediaControllers/*{MediaControllerId}*/EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/MediaControllers/*{MediaControllerId}*/Ports/*{PortId}*/
EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/Memory/*{MemoryId}*/EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/NetworkAdapters/*{NetworkAdapterId}*/EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/NetworkAdapters/*{NetworkAdapterId}*/Ports/*{PortId}*/
EnvironmentMetrics
/redfish/v1/Chassis/*{ChassisId}*/PCIeDevices/*{PCIeDeviceId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Drives/*{DriveId}*/
EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Memory/*{MemoryId}*/
EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Processors/*{ProcessorId}*/
EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Processors/*{ProcessorId}*/Ports/
{PortId}/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/Controllers/
{ControllerId}/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/Controllers/
{StorageControllerId}/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/Drives/
{DriveId}/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/
StorageControllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/
FabricAdapters/*{FabricAdapterId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/
GraphicsControllers/*{ControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/
Memory/*{MemoryId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/

PCIeDevices/*{PCIeDeviceId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Processors/*{ProcessorId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Processors/*{ProcessorId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Controllers/*{ControllerId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Controllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Drives/*{DriveId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/StorageControllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/CompositionService/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/USBControllers/*{ControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Fabrics/*{FabricId}*/Switches/*{SwitchId}*/EnvironmentMetrics
/redfish/v1/Fabrics/*{FabricId}*/Switches/*{SwitchId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Facilities/*{FacilityId}*/AmbientMetrics
/redfish/v1/Facilities/*{FacilityId}*/EnvironmentMetrics
/redfish/v1/Managers/*{ManagerId}*/DedicatedNetworkPorts/*{PortId}*/EnvironmentMetrics
/redfish/v1/Managers/*{ManagerId}*/USBPorts/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Drives/*{DriveId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Memory/*{MemoryId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Processors/*{ProcessorId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Processors/*{ProcessorId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/Controllers/*{ControllerId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/Controllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/Drives/*{DriveId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Storage/*{StorageId}*/StorageControllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/FabricAdapters/*{FabricAdapterId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/GraphicsControllers/*{ControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Memory/*{MemoryId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/PCIeDevices/*{PCIeDeviceId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Processors/*{ProcessorId}*/EnvironmentMetrics

/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Processors/*{ProcessorId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Controllers/*{ControllerId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Controllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Drives/*{DriveId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/StorageControllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ResourceBlocks/*{ResourceBlockId}*/Systems/*{ComputerSystemId}*/USBControllers/*{ControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Storage/*{StorageId}*/Controllers/*{ControllerId}*/EnvironmentMetrics
/redfish/v1/Storage/*{StorageId}*/Controllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Storage/*{StorageId}*/StorageControllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/FabricAdapters/*{FabricAdapterId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/GraphicsControllers/*{ControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Memory/*{MemoryId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/PCIeDevices/*{PCIeDeviceId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Processors/*{ProcessorId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Processors/*{ProcessorId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Controllers/*{ControllerId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Controllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/Drives/*{DriveId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/Storage/*{StorageId}*/StorageControllers/*{StorageControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/Systems/*{ComputerSystemId}*/USBControllers/*{ControllerId}*/Ports/*{PortId}*/EnvironmentMetrics
/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/EnvironmentMetrics
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/EnvironmentMetrics
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/EnvironmentMetrics

4.5.3 Properties

Property	Type	Attributes	Notes
AbsoluteHumidity *(v1.2+)* {}	object		Absolute humidity (g/cu m). For more information about this property, see SensorExcerpt in Property Details.
DewPointCelsius *(v1.1+)* {}	object		The dew point temperature (C). For more information about this property, see SensorExcerpt in Property Details.
EnergyJoules *(v1.2+)* {}	object		Energy consumption (J). For more information about this property, see SensorExcerpt in Property Details.
EnergykWh {	object (excerpt)		Energy consumption (kWh). This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.
ApparentkVAh *(v1.5+)*	number (kV.A.h)	*read-only (null)*	Apparent energy (kVAh).
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
LifetimeReading *(v1.1+)*	number	*read-only (null)*	The total accumulation value for this sensor.
ReactivekVARh *(v1.5+)*	number (kV.A.h)	*read-only (null)*	Reactive energy (kVARh).
Reading	number	*read-only (null)*	The sensor value.
SensorResetTime	string (date-time)	*read-only (null)*	The date and time when the time-based properties were last reset.
}			
FanSpeedsPercent [{	array (excerpt)		Fan speeds (percent). This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
DeviceName *(v1.2+)*	string	*read-only (null)*	The name of the device.
PhysicalContext	string (enum)	*read-only (null)*	The area or device to which this sensor measurement applies. *For the possible property values, see PhysicalContext in Property details.*
PhysicalSubContext	string (enum)	*read-only (null)*	The usage or location within a device to which this sensor measurement applies. *For the possible property values, see PhysicalSubContext in Property details.*

Property	Type	Attributes	Notes
Reading	number	*read-only (null)*	The sensor value.
SpeedRPM *(v1.2+)*	number ({rev}/min)	*read-only (null)*	The rotational speed.
}]			
HumidityPercent {}	object		Humidity (percent). For more information about this property, see SensorExcerpt in Property Details.
PowerLimitWatts *(v1.1+)* {	object (excerpt)		Power limit (W). This object is an excerpt of the *http://redfish.dmtf.org/schemas/v1/Control.json* resource located at the URI shown in DataSourceUri.
AllowableMax	number	*read-only (null)*	The maximum possible setting for this control.
AllowableMin	number	*read-only (null)*	The minimum possible setting for this control.
ControlMode	string (enum)	*read-write (null)*	The current operating mode of the control. *For the possible property values, see ControlMode in Property details.*
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this control.
DefaultSetPoint *(v1.3+)*	number	*read-only (null)*	The default set point of the control.
Reading	number	*read-only (null)*	The reading of the sensor associated with this control.
ReadingUnits	string	*read-only (null)*	The units of the sensor reading associated with this control.
SetPoint	number	*read-write (null)*	The desired set point of the control.
}			
PowerLoadPercent *(v1.1+)* {}	object		The power load (percent) for this device. For more information about this property, see SensorExcerpt in Property Details.
PowerWatts {	object (excerpt)		Power consumption (W). This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.
ApparentVA	number (V.A)	*read-only (null)*	The product of voltage and current for an AC circuit, in volt-ampere units.

Property	Type	Attributes	Notes
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
PhaseAngleDegrees *(v1.5+)*	number	*read-only (null)*	The phase angle (degrees) between the current and voltage waveforms.
PowerFactor	number	*read-only (null)*	The power factor for this sensor.
ReactiveVAR	number (V.A)	*read-only (null)*	The square root of the difference term of squared apparent VA and squared power (Reading) for a circuit, in VAR units.
Reading	number	*read-only (null)*	The sensor value.
}			
TemperatureCelsius {}	object		Temperature (Celsius). For more information about this property, see SensorExcerpt in Property Details.

4.5.4 Actions

4.5.4.1 ResetMetrics

Description

This action resets the summary metrics related to this equipment.

Action URI

{Base URI of target resource}/Actions/EnvironmentMetrics.ResetMetrics

Action parameters

This action takes no parameters.

4.5.4.2 ResetToDefaults *(v1.3+)*

Description

The action resets the values of writable properties to factory defaults.

Action URI

{Base URI of target resource}/Actions/EnvironmentMetrics.ResetToDefaults

Action parameters

This action takes no parameters.

4.5.5 Property details

4.5.5.1 ControlMode

The current operating mode of the control.

string	Description
Automatic	Automatically adjust control to meet the set point.
Disabled	The control has been disabled.
Manual	No automatic adjustments are made to the control.
Override	User override of the automatic set point value.

4.5.5.2 PhysicalContext

The area or device to which this sensor measurement applies.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.

string	Description
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.

string	Description
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.5.5.3 PhysicalSubContext

The usage or location within a device to which this sensor measurement applies.

string	Description
Input	The input.
Output	The output.

4.5.5.4 SensorExcerpt

The Sensor schema describes a sensor and its properties. This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.

DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
Reading	number	*read-only (null)*	The sensor value.

4.5.6 Example response


```
{
    "@odata.type": "#EnvironmentMetrics.v1_3_0.EnvironmentMetrics",
    "Name": "Processor Environment Metrics",
    "TemperatureCelsius": {
        "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/CPU1Temp",
        "Reading": 44
    },
    "PowerWatts": {
        "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/CPU1Power",
        "Reading": 12.87
    },
    "FanSpeedsPercent": [
        {
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/CPUFan1",
            "DeviceName": "CPU #1 Fan Speed",
            "Reading": 80
        }
    ],
    "@odata.id": "/redfish/v1/Systems/437XR1138R2/Processors/1/EnvironmentMetrics"
}
```


4.6 Facility 1.4.0

Version	*v1.4*	*v1.3*	*v1.2*	*v1.1*	*v1.0*
Release	2023.1	2021.3	2021.2	2020.4	2019.4

4.6.1 Description

The Facility schema represents the physical location containing equipment, such as a room, building, or campus.

4.6.2 URIs

/redfish/v1/Facilities/*{FacilityId}*

4.6.3 Properties

Property	Type	Attributes	Notes
AmbientMetrics *(v1.1+)* {	object		The link to the ambient environment metrics for this facility. See the *EnvironmentMetrics* schema for details on this property.
@odata.id	string	*read-only*	Link to a EnvironmentMetrics resource. See the Links section and the *EnvironmentMetrics* schema for details.
}			
EnvironmentMetrics *(v1.1+)* {	object		The link to the environment metrics for this facility. See the *EnvironmentMetrics* schema for details on this property.
@odata.id	string	*read-only*	Link to a EnvironmentMetrics resource. See the Links section and the *EnvironmentMetrics* schema for details.
}			
FacilityType	string (enum)	*read-only* *required*	The type of location this resource represents. *For the possible property values, see FacilityType in Property details.*
Links {	object		The links to other resources that are related to this resource.
CDUs *(v1.4+)* [{	array		An array of links to the cooling distribution units in this facility.
@odata.id	string	*read-write*	Link to a CoolingUnit resource. See the Links section and the *CoolingUnit* schema for details.
}]			
CDUs@odata.count	integer	*read-only*	The number of items in a collection.
ContainedByFacility {	object		The link to the facility that contains this facility.
@odata.id	string	*read-write*	Link to another Facility resource.
}			
ContainsChassis [{	array		An array of links to outermost chassis contained within this facility.
@odata.id	string	*read-write*	Link to a Chassis resource. See the Links section and the *Chassis* schema for details.
}]			

Property	Type	Attributes	Notes
ContainsChassis@odata.count	integer	*read-only*	The number of items in a collection.
ContainsFacilities [{	array		An array of links to other facilities contained within this facility.
@odata.id	string	*read-write*	Link to another Facility resource.
}]			
ContainsFacilities@odata.count	integer	*read-only*	The number of items in a collection.
CoolingLoops *(v1.4+)* [{	array		An array of links to the cooling loops in this facility.
@odata.id	string	*read-write*	Link to a CoolingLoop resource. See the Links section and the *CoolingLoop* schema for details.
}]			
CoolingLoops@odata.count	integer	*read-only*	The number of items in a collection.
ElectricalBuses *(v1.3+)* [{ }]	array (object)		An array of links to the electrical buses in this facility. See the *PowerDistribution* schema for details on this property.
ElectricalBuses@odata.count	integer	*read-only*	The number of items in a collection.
FloorPDUs [{ }]	array (object)		An array of links to the floor power distribution units in this facility. See the *PowerDistribution* schema for details on this property.
FloorPDUs@odata.count	integer	*read-only*	The number of items in a collection.
ImmersionUnits *(v1.4+)* [{	array		An array of links to the immersion cooling units in this facility.
@odata.id	string	*read-write*	Link to a CoolingUnit resource. See the Links section and the *CoolingUnit* schema for details.
}]			
ImmersionUnits@odata.count	integer	*read-only*	The number of items in a collection.
ManagedBy [{ }]	array (object)		An array of links to the managers responsible for managing this facility. See the *Manager* schema for details on this property.
ManagedBy@odata.count	integer	*read-only*	The number of items in a collection.
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.

Property	Type	Attributes	Notes
PowerShelves *(v1.2+)* [{ }]	array (object)		An array of links to the power shelves in this facility. See the *PowerDistribution* schema for details on this property.
PowerShelves@odata.count	integer	*read-only*	The number of items in a collection.
RackPDUs [{ }]	array (object)		An array of links to the rack-level power distribution units in this facility. See the *PowerDistribution* schema for details on this property.
RackPDUs@odata.count	integer	*read-only*	The number of items in a collection.
Switchgear [{ }]	array (object)		An array of links to the switchgear in this facility. See the *PowerDistribution* schema for details on this property.
Switchgear@odata.count	integer	*read-only*	The number of items in a collection.
TransferSwitches [{ }]	array (object)		An array of links to the transfer switches in this facility. See the *PowerDistribution* schema for details on this property.
TransferSwitches@odata.count	integer	*read-only*	The number of items in a collection.
}			
Location {}	object		The location of the facility. See the *Resource* schema for details on this property.
PowerDomains {	object		Link to the power domains in this facility. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *PowerDomain*. See the PowerDomain schema for details.
}			
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.

4.6.4 Property details

4.6.4.1 FacilityType

The type of location this resource represents.

string	Description
Building	A structure with a roof and walls.

string	Description
Floor	A floor inside of a building.
Room	A room inside of a building or floor.
Site	A small area consisting of several buildings.

4.6.5 Example response


```
{
    "@odata.type": "#Facility.v1_3_0.Facility",
    "Id": "Room237",
    "Name": "Room #237, 2nd Floor",
    "FacilityType": "Room",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "Location": {
        "PostalAddress": {
            "Country": "US",
            "Territory": "OR",
            "City": "Portland",
            "Street": "1001 SW 5th Avenue",
            "HouseNumber": 1100,
            "Name": "DMTF, Inc.",
            "PostalCode": "97204",
            "Floor": "2",
            "Room": "237"
        }
    },
    "PowerDomains": {
        "@odata.id": "/redfish/v1/Facilities/Room237/PowerDomains"
    },
    "Links": {
        "ContainedByFacility": {
            "@odata.id": "/redfish/v1/Facilities/Building"
        },
        "RackPDUs": [
            {
                "@odata.id": "/redfish/v1/PowerEquipment/RackPDUs/1"
            }
        ]
    },
    "@odata.id": "/redfish/v1/Facilities/Room237"
}
```

4.7 Filter 1.0.0

Version	*v1.0*
Release	2023.1

4.7.1 Description

The Filter schema describes a filter unit for a cooling system or similar device.

4.7.2 URIs

/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/Pumps/*{PumpId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/Reservoirs/*{ReservoirId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/Pumps/*{PumpId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/Reservoirs/*{ReservoirId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/Pumps/*{PumpId}*/Filters/*{FilterId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/Reservoirs/*{ReservoirId}*/Filters/*{FilterId}*

4.7.3 Properties

Property	Type	Attributes	Notes
Assembly {}	object		The link to the assembly associated with this filter. See the *Assembly* schema for details on this property.
HotPluggable	boolean	*read-only (null)*	An indication of whether this device can be inserted or removed while the equipment is in operation.
Location {}	object		The location of the filter. See the *Resource* schema for details on this property.
LocationIndicatorActive	boolean	*read-write (null)*	An indicator allowing an operator to physically locate this resource.
Manufacturer	string	*read-only (null)*	The manufacturer of this filter.

Property	Type	Attributes	Notes
Model	string	*read-only (null)*	The model number for this filter.
PartNumber	string	*read-only (null)*	The part number for this filter.
PhysicalContext	string (enum)	*read-only*	The area or device associated with this filter. *For the possible property values, see PhysicalContext in Property details.*
RatedServiceHours	number	*read-only (null)*	The rated hours of service life for this filter.
Replaceable	boolean	*read-only (null)*	An indication of whether this component can be independently replaced as allowed by the vendor's replacement policy.
SerialNumber	string	*read-only (null)*	The serial number for this filter.
ServicedDate	string (date-time)	*read-write (null)*	The date this filter was put into service.
ServiceHours	number	*read-write (null)*	The hours of service this filter has provided.
SparePartNumber	string	*read-only (null)*	The spare part number for this filter.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
UserLabel	string	*read-write*	A user-assigned label.

4.7.4 Property details

4.7.4.1 PhysicalContext

The area or device associated with this filter.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.

string	Description
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.

string	Description
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.7.5 Example response


```
{
    "@odata.type": "#Filter.v1_0_0.Filter",
    "Id": "1",
    "Name": "Cooling Loop Filter",
    "ServicedDate": "2020-12-24T08:00:00Z",
    "ServiceHours": 5791,
    "RatedServiceHours": 10000,
    "Manufacturer": "Contoso",
    "Model": "MyCoffee",
    "PartNumber": "Cone4",
```

```
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "Location": {
        "Placement": {
            "Row": "North 1"
        }
    },
    "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/Filters/1",
    "@Redfish.Copyright": "Copyright 2014-2022 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.8 LeakDetection 1.0.0

Version	*v1.0*
Release	2023.1

4.8.1 Description

The LeakDetection schema contains definitions for reporting leaks in liquid cooling systems or other equipment.

4.8.2 URIs

/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/LeakDetection
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/LeakDetection
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/LeakDetection

4.8.3 Properties

Property	Type	Attributes	Notes
LeakDetectorGroups [{	array		The groups of leak detection equipment.
Detectors [{	array (excerpt)		The leak detection states from all related leak detection devices in this group. This object is an excerpt of the *LeakDetector* resource located at the URI shown in DataSourceUri.

Property	Type	Attributes	Notes
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this leak detector.
DetectorState	string (enum)	*read-only (null)*	The state of the leak detector. *For the possible property values, see DetectorState in Property details.*
PhysicalContext	string (enum)	*read-only (null)*	The area or device to which this leak detector applies. *For the possible property values, see PhysicalContext in Property details.*
PhysicalSubContext	string (enum)	*read-only (null)*	The usage or location within a device to which this leak detector applies. *For the possible property values, see PhysicalSubContext in Property details.*
}]			
Detectors@odata.count	integer	*read-only*	The number of items in a collection.
GroupName	string	*read-only*	The name of this leak detector group.
HumidityPercent {	object (excerpt)		Humidity (percent). This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
Reading	number	*read-only (null)*	The sensor value.
}			
}]			
LeakDetectors {	object		The link to the collection of leak detectors within this subsystem. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *LeakDetector*. See the LeakDetector schema for details.
}			
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.

4.8.4 Property details

4.8.4.1 DetectorState

The state of the leak detector.

string	Description
Critical	A critical condition requires immediate attention.
OK	Normal.
Warning	A condition requires attention.

4.8.4.2 PhysicalContext

The area or device to which this leak detector applies.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.

string	Description
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.

string	Description
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.8.4.3 PhysicalSubContext

The usage or location within a device to which this leak detector applies.

string	Description
Input	The input.
Output	The output.

4.8.5 Example response

```
{
    "@odata.type": "#LeakDetection.v1_0_0.LeakDetection",
    "Id": "LeakDetection",
    "Name": "Leak Detection Systems",
    "Status": {
        "State": "Enabled",
        "Health": "OK",
        "Conditions": []
    },
    "LeakDetectorGroups": [{
        "GroupName": "Detectors under and around the CDU",
        "HumidityPercent": {
            "Reading": 45
        },
        "Detectors": [{
                "DataSourceUri": "/redfish/v1/ThermalEquipment/CDUs/1/LeakDetection/LeakDetectors/Moisture",
                "DeviceName": "Moisture-type Leak Detector",
                "DetectorState": "OK"
            },
            {
                "DeviceName": "Leak Detection Rope 1",
                "DetectorState": "OK"
            },
            {
                "DataSourceUri": "/redfish/v1/ThermalEquipment/CDUs/1/LeakDetection/LeakDetectors/Overflow",
                "DeviceName": "Overflow Float Switch",
                "DetectorState": "OK"
            }
```

```
            ]
        }],
        "LeakDetectors": {
            "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/LeakDetection/LeakDetectors"
        },
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/LeakDetection",
        "@Redfish.Copyright": "Copyright 2014-2022 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
    }
```


4.9 LeakDetector 1.0.0

Version	*v1.0*
Release	2023.1

4.9.1 Description

The LeakDetector schema describes a state-based or digital value leak detector and its properties.

4.9.2 URIs

/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/LeakDetection/LeakDetectors/*{LeakDetectorId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/LeakDetection/LeakDetectors/*{LeakDetectorId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/LeakDetection/LeakDetectors/*{LeakDetectorId}*

4.9.3 Properties

Property	Type	Attributes	Notes
DetectorState	string (enum)	*read-only (null)*	The state of the leak detector. *For the possible property values, see DetectorState in Property details.*
LeakDetectorType	string (enum)	*read-only (null)*	The type of leak detection sensor. *For the possible property values, see LeakDetectorType in Property details.*
Location {}	object		The location information for this leak detector. See the *Resource* schema for details on this property.

Property	Type	Attributes	Notes
Manufacturer	string	*read-only (null)*	The manufacturer of this leak detector.
Model	string	*read-only (null)*	The model number of the leak detector.
PartNumber	string	*read-only (null)*	The part number of the leak detector.
PhysicalContext	string (enum)	*read-only (null)*	The area or device to which this leak detector applies. *For the possible property values, see PhysicalContext in Property details.*
PhysicalSubContext	string (enum)	*read-only (null)*	The usage or location within a device to which this leak detector applies. *For the possible property values, see PhysicalSubContext in Property details.*
SensingFrequency	number	*read-only (null)*	The time interval between readings of the physical leak detector.
SerialNumber	string	*read-only (null)*	The serial number of the leak detector.
SKU	string	*read-only (null)*	The SKU of the leak detector.
SparePartNumber	string	*read-only (null)*	The spare part number of the leak detector.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.

4.9.4 Property details

4.9.4.1 DetectorState

The state of the leak detector.

string	Description
Critical	A critical condition requires immediate attention.
OK	Normal.
Warning	A condition requires attention.

4.9.4.2 LeakDetectorType

The type of leak detection sensor.

string	Description
FloatSwitch	A float switch.
Moisture	A moisture sensor.

4.9.4.3 PhysicalContext

The area or device to which this leak detector applies.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.

string	Description
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).

string	Description
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.9.4.4 PhysicalSubContext

The usage or location within a device to which this leak detector applies.

string	Description
Input	The input.
Output	The output.

4.9.5 Example response


```
{
    "@odata.type": "#LeakDetector.v1_0_0.LeakDetector",
    "Id": "Moisture",
    "Name": "Moisture-type Leak Detector",
    "LeakDetectorType": "Moisture",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "DetectorState": "OK",
    "PartNumber": "3493-A44",
    "SerialNumber": "916239",
    "Manufacturer": "Contoso Water Detection Systems",
    "Model": "Depends 3000",
    "Location": {
        "PartLocation": {
            "Reference": "Bottom",
            "ServiceLabel": "Leak Detector"
        }
    },
    "PhysicalContext": "Chassis",
    "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/LeakDetection/LeakDetectors/Moisture",
```

```
    "@Redfish.Copyright": "Copyright 2018-2022 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.10 Pump 1.0.0

Version	*v1.0*
Release	2023.1

4.10.1 Description

The Pump schema describes a pump unit for a cooling system or similar device.

4.10.2 URIs

/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/Pumps/*{PumpId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/Pumps/*{PumpId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/Pumps/*{PumpId}*

4.10.3 Properties

Property	Type	Attributes	Notes
Assembly {}	object		The link to the assembly associated with this pump. See the *Assembly* schema for details on this property.
AssetTag	string	*read-write (null)*	The user-assigned asset tag for this equipment.
Filters {	object		A link to a collection of filters. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Filter*. See the Filter schema for details.
}			
FirmwareVersion	string	*read-only*	The firmware version of this equipment.
Location {}	object		The location of the pump. See the *Resource* schema for details on this property.
LocationIndicatorActive	boolean	*read-write (null)*	An indicator allowing an operator to physically locate this resource.

Property	Type	Attributes	Notes
Manufacturer	string	*read-only (null)*	The manufacturer of this pump.
Model	string	*read-only (null)*	The model number for this pump.
PartNumber	string	*read-only (null)*	The part number for this pump.
PhysicalContext	string (enum)	*read-only*	The area or device associated with this pump. *For the possible property values, see PhysicalContext in Property details.*
ProductionDate	string (date-time)	*read-only (null)*	The production or manufacturing date of this equipment.
PumpSpeedPercent {	object (excerpt)		The pump speed (%). This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
Reading	number	*read-only (null)*	The sensor value.
SpeedRPM *(v1.2+)*	number ({rev}/min)	*read-only (null)*	The rotational speed.
}			
PumpType	string (enum)	*read-only (null)*	The type of pump. *For the possible property values, see PumpType in Property details.*
SerialNumber	string	*read-only (null)*	The serial number for this pump.
ServiceHours	number	*read-write (null)*	The hours of service this pump has provided.
SparePartNumber	string	*read-only (null)*	The spare part number for this pump.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
UserLabel	string	*read-write*	A user-assigned label.
Version	string	*read-only (null)*	The hardware version of this equipment.

4.10.4 Property details

4.10.4.1 PhysicalContext

The area or device associated with this pump.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.

string	Description
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.10.4.2 PumpType

The type of pump.

string	Description
Compressor	A compressor.
Liquid	A water or liquid pump.

4.10.5 Example response


```
{
    "@odata.type": "#Pump.v1_0_0.Pump",
    "Id": "1",
    "PumpType": "Liquid",
    "Name": "Immersion Unit Pump",
    "Version": "1.03b",
    "ProductionDate": "2021-06-24T08:00:00Z",
    "Manufacturer": "Contoso",
    "Model": "UP-JAM",
    "SerialNumber": "29347ZT599",
    "PartNumber": "MAARS",
    "AssetTag": "PDX5-92399",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "PumpSpeedPercent": {
        "Reading": 62,
        "SpeedRPM": 1800
    },
    "@odata.id": "/redfish/v1/ThermalEquipment/ImmersionUnits/1/Pumps/1",
    "@Redfish.Copyright": "Copyright 2014-2020 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.11 Reservoir 1.0.0

Version	*v1.0*
Release	2023.1

4.11.1 Description

The Reservoir schema describes a reservoir unit for a cooling system or similar device.

4.11.2 URIs

/redfish/v1/ThermalEquipment/CDUs/*{CoolingUnitId}*/Reservoirs/*{ReservoirId}*
/redfish/v1/ThermalEquipment/HeatExchangers/*{CoolingUnitId}*/Reservoirs/*{ReservoirId}*
/redfish/v1/ThermalEquipment/ImmersionUnits/*{CoolingUnitId}*/Reservoirs/*{ReservoirId}*

4.11.3 Properties

Property	Type	Attributes	Notes
Assembly {}	object		The link to the assembly associated with this reservoir. See the *Assembly* schema for details on this property.
CapacityLiters	number	*read-only (null)*	The capacity of the reservoir (l).
Coolant {	object		Details about the coolant used in this unit. See the *CoolingLoop* schema for details on this property.
@odata.id	string	*read-only*	Link to a Coolant resource. See the Links section and the *CoolingLoop* schema for details.
}			
Filters {	object		A link to a collection of filters. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Filter*. See the Filter schema for details.
}			
FluidLevelPercent {}	object		The fluid capacity filled (percent). For more information about this property, see SensorExcerpt in Property Details.
FluidLevelStatus	string (enum)	*read-only (null)*	The status of the fluid level in this reservoir. *For the possible property values, see FluidLevelStatus in Property details.*
InternalPressurekPa {}	object		The internal pressure (kPa) reading. For more information about this property, see SensorExcerpt in Property Details.
Location {}	object		The location of the reservoir. See the *Resource* schema for details on this property.
LocationIndicatorActive	boolean	*read-write (null)*	An indicator allowing an operator to physically locate this resource.

Property	Type	Attributes	Notes
Manufacturer	string	*read-only (null)*	The manufacturer of this reservoir.
Model	string	*read-only (null)*	The model number for this reservoir.
PartNumber	string	*read-only (null)*	The part number for this reservoir.
PhysicalContext	string (enum)	*read-only*	The area or device associated with this reservoir. *For the possible property values, see PhysicalContext in Property details.*
ReservoirType	string (enum)	*read-only (null)*	The type of reservoir. *For the possible property values, see ReservoirType in Property details.*
SerialNumber	string	*read-only (null)*	The serial number for this reservoir.
SparePartNumber	string	*read-only (null)*	The spare part number for this reservoir.
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
UserLabel	string	*read-write*	A user-assigned label.

4.11.4 Property details

4.11.4.1 FluidLevelStatus

The status of the fluid level in this reservoir.

string	Description
Critical	A critical condition requires immediate attention.
OK	Normal.
Warning	A condition requires attention.

4.11.4.2 PhysicalContext

The area or device associated with this reservoir.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.

string	Description
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.11.4.3 ReservoirType

The type of reservoir.

string	Description
Immersion	An immersion cooling tank.

string	Description
Inline	An inline or integrated reservoir.
Overflow	An overflow reservoir for excess fluid.
Reserve	A reservoir providing reserve fluid capacity.

4.11.4.4 SensorExcerpt

The Sensor schema describes a sensor and its properties. This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.

DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
Reading	number	*read-only (null)*	The sensor value.

4.11.5 Example response

```
{
    "@odata.type": "#Reservoir.v1_0_0.Reservoir",
    "Id": "1",
    "ReservoirType": "Reserve",
    "Name": "Cooling Loop Reservoir",
    "Manufacturer": "Contoso",
    "Model": "Tarantino",
    "CapacityLiters": 10,
    "PartNumber": "Pink",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "Location": {
        "Placement": {
            "Row": "North 1"
        }
    },
    "FluidLevelPercent": {
        "Reading": 64.8
    },
    "InternalPressurekPa": {
```

```
        "Reading": 138.7
    },
    "@odata.id": "/redfish/v1/ThermalEquipment/CDUs/1/Reservoirs/1",
    "@Redfish.Copyright": "Copyright 2014-2020 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```


4.12 Sensor 1.7.0

Version	*v1.7*	*v1.6*	*v1.5*	*v1.4*	*v1.3*	*v1.2*	*v1.1*	*v1.0*
Release	2023.1	2022.2	2021.4	2021.2	2021.1	2020.4	2019.4	2018.3

4.12.1 Description

The Sensor schema describes a sensor and its properties.

4.12.2 URIs

/redfish/v1/Chassis/*{ChassisId}*/Sensors/*{SensorId}*
/redfish/v1/PowerEquipment/FloorPDUs/*{PowerDistributionId}*/Sensors/*{SensorId}*
/redfish/v1/PowerEquipment/PowerShelves/*{PowerDistributionId}*/Sensors/*{SensorId}*
/redfish/v1/PowerEquipment/RackPDUs/*{PowerDistributionId}*/Sensors/*{SensorId}*
/redfish/v1/PowerEquipment/Switchgear/*{PowerDistributionId}*/Sensors/*{SensorId}*
/redfish/v1/PowerEquipment/TransferSwitches/*{PowerDistributionId}*/Sensors/*{SensorId}*

4.12.3 Properties

Property	Type	Attributes	Notes
Accuracy	number (%)	*read-only (null)*	The estimated percent error of measured versus actual values.
AdjustedMaxAllowableOperatingValue	number	*read-only (null)*	The adjusted maximum allowable operating value for this equipment based on the environmental conditions.
AdjustedMinAllowableOperatingValue	number	*read-only (null)*	The adjusted minimum allowable operating value for this equipment based on the environmental conditions.

Property	Type	Attributes	Notes
ApparentkVAh *(v1.5+)*	number (kV.A.h)	*read-only (null)*	Apparent energy (kVAh).
ApparentVA	number (V.A)	*read-only (null)*	The product of voltage and current for an AC circuit, in volt-ampere units.
AverageReading *(v1.4+)*	number	*read-only (null)*	The average sensor value.
AveragingInterval *(v1.4+)*	string (duration)	*read-write (null)*	The interval over which the average sensor value is calculated.
AveragingIntervalAchieved *(v1.4+)*	boolean	*read-only (null)*	Indicates that enough readings were collected to calculate the average sensor reading over the averaging interval time.
Calibration *(v1.4+)*	number	*read-write (null)*	The calibration offset applied to the Reading.
CalibrationTime *(v1.4+)*	string (date-time)	*read-write (null)*	The date and time that the sensor was last calibrated.
CrestFactor *(v1.1+)*	number	*read-only (null)*	The crest factor for this sensor.
ElectricalContext	string (enum)	*read-only (null)*	The combination of current-carrying conductors. *For the possible property values, see ElectricalContext in Property details.*
Implementation *(v1.1+)*	string (enum)	*read-only (null)*	The implementation of the sensor. *For the possible property values, see Implementation in Property details.*
LifetimeReading *(v1.1+)*	number	*read-only (null)*	The total accumulation value for this sensor.
Links *(v1.3+)* {	object		The links to other resources that are related to this resource.
AssociatedControls *(v1.4+)* [{ }]	array (object)		An array of links to the controls that can affect this sensor. See the *Control* schema for details on this property.
AssociatedControls@odata.count	integer	*read-only*	The number of items in a collection.
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.
}			

Property	Type	Attributes	Notes
LoadPercent *(deprecated v1.1)*	number (%)	*read-only (null)*	The power load utilization for this sensor. *Deprecated in v1.1 and later. This property has been deprecated in favor of using a sensor instance with a ReadingType of* `Percent` *to show utilization values when needed.*
Location {}	object		The location information for this sensor. See the *Resource* schema for details on this property.
LowestReading *(v1.4+)*	number	*read-only (null)*	The lowest sensor value.
LowestReadingTime *(v1.4+)*	string (date-time)	*read-only (null)*	The time when the lowest sensor value occurred.
MaxAllowableOperatingValue	number	*read-only (null)*	The maximum allowable operating value for this equipment.
MinAllowableOperatingValue	number	*read-only (null)*	The minimum allowable operating value for this equipment.
PeakReading	number	*read-only (null)*	The peak sensor value.
PeakReadingTime	string (date-time)	*read-only (null)*	The time when the peak sensor value occurred.
PhaseAngleDegrees *(v1.5+)*	number	*read-only (null)*	The phase angle (degrees) between the current and voltage waveforms.
PhysicalContext	string (enum)	*read-only (null)*	The area or device to which this sensor measurement applies. *For the possible property values, see PhysicalContext in Property details.*
PhysicalSubContext	string (enum)	*read-only (null)*	The usage or location within a device to which this sensor measurement applies. *For the possible property values, see PhysicalSubContext in Property details.*
PowerFactor	number	*read-only (null)*	The power factor for this sensor.
Precision	number	*read-only (null)*	The number of significant digits in the reading.
ReactivekVARh *(v1.5+)*	number (kV.A.h)	*read-only (null)*	Reactive energy (kVARh).
ReactiveVAR	number (V.A)	*read-only (null)*	The square root of the difference term of squared apparent VA and squared power (Reading) for a circuit, in VAR units.

Property	Type	Attributes	Notes
Reading	number	*read-only (null)*	The sensor value.
ReadingBasis *(v1.7+)*	string (enum)	*read-only (null)*	The basis for the reading of this sensor. *For the possible property values, see ReadingBasis in Property details.*
ReadingRangeMax	number	*read-only (null)*	The maximum possible value for this sensor.
ReadingRangeMin	number	*read-only (null)*	The minimum possible value for this sensor.
ReadingTime *(v1.1+)*	string (date-time)	*read-only (null)*	The date and time that the reading was acquired from the sensor.
ReadingType	string (enum)	*read-only (null)*	The type of sensor. *For the possible property values, see ReadingType in Property details.*
ReadingUnits	string	*read-only (null)*	The units of the reading and thresholds.
RelatedItem *(v1.2+)* [{	array		An array of links to resources or objects that this sensor services.
@odata.id	string (URI)	*read-only*	The unique identifier for a resource.
}]			
SensingFrequency *(deprecated v1.1)*	number	*read-only (null)*	The time interval between readings of the physical sensor. *Deprecated in v1.1 and later. This property has been deprecated in favor of the SensingInterval property, which uses the duration time format for interoperability.*
SensingInterval *(v1.1+)*	string (duration)	*read-only (null)*	The time interval between readings of the sensor.
SensorGroup *(v1.4+)* {}	object		The group of sensors that provide readings for this sensor. See the *v1_4_1.v1_4_1* schema for details on this property.
SensorResetTime	string (date-time)	*read-only (null)*	The date and time when the time-based properties were last reset.
SpeedRPM *(v1.2+)*	number ({rev}/min)	*read-only (null)*	The rotational speed.

Property	Type	Attributes	Notes
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.
THDPercent *(v1.1+)*	number	*read-only (null)*	The total harmonic distortion (THD).
Thresholds {	object		The set of thresholds defined for this sensor.
LowerCaution {}	object		The value at which the reading is below normal range. For more information about this property, see Threshold in Property Details.
LowerCautionUser *(v1.2+)* {}	object		A user-defined value at which the reading is considered below normal range. For more information about this property, see Threshold in Property Details.
LowerCritical {}	object		The value at which the reading is below normal range but not yet fatal. For more information about this property, see Threshold in Property Details.
LowerCriticalUser *(v1.2+)* {}	object		A user-defined value at which the reading is considered below normal range but not yet fatal. For more information about this property, see Threshold in Property Details.
LowerFatal {}	object		The value at which the reading is below normal range and fatal. For more information about this property, see Threshold in Property Details.
UpperCaution {}	object		The value at which the reading is above normal range. For more information about this property, see Threshold in Property Details.
UpperCautionUser *(v1.2+)* {}	object		A user-defined value at which the reading is considered above normal range. For more information about this property, see Threshold in Property Details.
UpperCritical {}	object		The value at which the reading is above normal range but not yet fatal. For more information about this property, see Threshold in Property Details.
UpperCriticalUser *(v1.2+)* {}	object		A user-defined value at which the reading is considered above normal range but not yet fatal. For more information about this property, see Threshold in Property Details.

Property	Type	Attributes	Notes
UpperFatal {}	object		The value at which the reading is above normal range and fatal. For more information about this property, see Threshold in Property Details.
}			
VoltageType	string (enum)	*read-only (null)*	The voltage type for this sensor. *For the possible property values, see VoltageType in Property details.*

4.12.4 Actions

4.12.4.1 ResetMetrics

Description

Resets metrics related to this sensor.

Action URI

{Base URI of target resource}/Actions/Sensor.ResetMetrics

Action parameters

This action takes no parameters.

4.12.4.2 ResetToDefaults *(v1.6+)*

Description

The action resets the values of writable properties to factory defaults.

Action URI

{Base URI of target resource}/Actions/Sensor.ResetToDefaults

Action parameters

This action takes no parameters.

4.12.5 Property details

4.12.5.1 Activation

The direction of crossing that activates this threshold.

string	Description
Decreasing	Value decreases below the threshold.
Disabled *(v1.7+)*	The threshold is disabled.
Either	Value crosses the threshold in either direction.
Increasing	Value increases above the threshold.

4.12.5.2 ElectricalContext

The combination of current-carrying conductors.

string	Description
Line1	The circuits that share the L1 current-carrying conductor.
Line1ToLine2	The circuit formed by L1 and L2 current-carrying conductors.
Line1ToNeutral	The circuit formed by L1 and neutral current-carrying conductors.
Line1ToNeutralAndL1L2	The circuit formed by L1, L2, and neutral current-carrying conductors.
Line2	The circuits that share the L2 current-carrying conductor.
Line2ToLine3	The circuit formed by L2 and L3 current-carrying conductors.
Line2ToNeutral	The circuit formed by L2 and neutral current-carrying conductors.
Line2ToNeutralAndL1L2	The circuit formed by L1, L2, and Neutral current-carrying conductors.
Line2ToNeutralAndL2L3	The circuits formed by L2, L3, and neutral current-carrying conductors.
Line3	The circuits that share the L3 current-carrying conductor.
Line3ToLine1	The circuit formed by L3 and L1 current-carrying conductors.
Line3ToNeutral	The circuit formed by L3 and neutral current-carrying conductors.
Line3ToNeutralAndL3L1	The circuit formed by L3, L1, and neutral current-carrying conductors.

string	Description
LineToLine	The circuit formed by two current-carrying conductors.
LineToNeutral	The circuit formed by a line and neutral current-carrying conductor.
Neutral	The grounded current-carrying return circuit of current-carrying conductors.
Total	The circuit formed by all current-carrying conductors.

4.12.5.3 Implementation

The implementation of the sensor.

string	Description
PhysicalSensor	The reading is acquired from a physical sensor.
Reported	The reading is obtained from software or a device.
Synthesized	The reading is obtained by applying a calculation on one or more properties or multiple sensors. The calculation is not provided.

4.12.5.4 PhysicalContext

The area or device to which this sensor measurement applies.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.

string	Description
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.

string	Description
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.12.5.5 PhysicalSubContext

The usage or location within a device to which this sensor measurement applies.

string	Description
Input	The input.
Output	The output.

4.12.5.6 ReadingBasis

The basis for the reading of this sensor.

string	Description
Delta	A reading that reports the difference between two measurements.
Headroom	A reading that decreases as it approaches a defined reference point.
Zero	A zero-based reading.

4.12.5.7 ReadingType

The type of sensor.

string	Description
AbsoluteHumidity *(v1.5+)*	Absolute humidity (g/cu m).
AirFlow *(deprecated v1.7)*	Air flow (cu ft/min). *Deprecated in v1.7 and later. This value has been deprecated in favor of* `AirFlowCMM` *for consistent use of SI units.*
AirFlowCMM *(v1.7+)*	Air flow (m^3/min).
Altitude	Altitude (m).
Barometric	Barometric pressure (mm).
ChargeAh *(v1.4+)*	Charge (Ah).
Current	Current (A).
EnergyJoules	Energy (J).
EnergykWh	Energy (kWh).
EnergyWh *(v1.4+)*	Energy (Wh).
Frequency	Frequency (Hz).
Heat *(v1.7+)*	Heat (kW).
Humidity	Relative humidity (percent).
LiquidFlow *(deprecated v1.7)*	Liquid flow (L/s). *Deprecated in v1.7 and later. This value has been deprecated in favor of* `LiquidFlowLPM` *for consistency of units typically expected or reported by Sensor and Control resources.*
LiquidFlowLPM *(v1.7+)*	Liquid flow (L/min).
LiquidLevel	Liquid level (cm).
Percent *(v1.1+)*	Percent (%).
Power	Power (W).
Pressure *(deprecated v1.7)*	Pressure (Pa). *Deprecated in v1.7 and later. This value has been deprecated in favor of* `PressurePa` *or* `PressurekPa` *for consistency of units between Sensor and Control resources.*
PressurekPa *(v1.5+)*	Pressure (kPa).
PressurePa *(v1.7+)*	Pressure (Pa).

string	Description
Rotational	Rotational (RPM).
Temperature	Temperature (C).
Voltage	Voltage (VAC or VDC).

4.12.5.8 Threshold

The threshold definition for a sensor.

Activation	string (enum)	*read-write (null)*	The direction of crossing that activates this threshold. *For the possible property values, see Activation in Property details.*
DwellTime	string (duration)	*read-write (null)*	The duration the sensor value must violate the threshold before the threshold is activated.
HysteresisDuration *(v1.7+)*	string (duration)	*read-write (null)*	The duration the sensor value must not violate the threshold before the threshold is deactivated.
HysteresisReading *(v1.7+)*	number	*read-write (null)*	The reading offset from the threshold value required to clear the threshold.
Reading	number	*read-write (null)*	The threshold value.

4.12.5.9 VoltageType

The voltage type for this sensor.

string	Description
AC	Alternating current.
DC	Direct current.

4.12.6 Example response


```
{
    "@odata.type": "#Sensor.v1_6_0.Sensor",
    "Id": "CabinetTemp",
    "Name": "Rack Temperature",
    "ReadingType": "Temperature",
    "ReadingTime": "2019-12-25T04:14:33+06:00",
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "Reading": 31.6,
    "ReadingUnits": "C",
    "ReadingRangeMin": 0,
    "ReadingRangeMax": 70,
    "Accuracy": 0.25,
    "Precision": 1,
    "SensingInterval": "PT3S",
    "PhysicalContext": "Chassis",
    "Thresholds": {
        "UpperCritical": {
            "Reading": 40,
            "Activation": "Increasing"
        },
        "UpperCaution": {
            "Reading": 35,
            "Activation": "Increasing"
        },
        "LowerCaution": {
            "Reading": 10,
            "Activation": "Increasing"
        }
    },
    "@odata.id": "/redfish/v1/Chassis/1/Sensors/CabinetTemp"
}
```


4.13 ServiceRoot 1.16.0

Version	*v1.16*	*v1.15*	*v1.14*	*v1.13*	*v1.12*	*v1.11*	*v1.10*	*v1.9*	*v1.8*	*v1.7*	*v1.6*	...
Release	2023.1	2022.3	2022.1	2021.4	2021.3	2021.2	2021.1	2020.3	2020.2	2020.1	2019.4	...

4.13.1 Description

The ServiceRoot schema describes the root of the Redfish service, located at the '/redfish/v1' URI. All other resources accessible through the Redfish interface on this device are linked directly or indirectly from the service root.

4.13.2 URIs

/redfish/v1
/redfish/v1/

4.13.3 Properties

Property	Type	Attributes	Notes
AccountService {}	object		The link to the account service. See the *AccountService* schema for details on this property.
AggregationService *(v1.8+)* {}	object		The link to the aggregation service. See the *AggregationService* schema for details on this property.
Cables *(v1.11+)* {	object		The link to a collection of cables. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Cable*. See the Cable schema for details.
}			
CertificateService *(v1.5+)* {}	object		The link to the certificate service. See the *CertificateService* schema for details on this property.
Chassis {	object		The link to a collection of chassis. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Chassis*. See the Chassis schema for details.
}			
ComponentIntegrity *(v1.13+)* {	object		The link to a collection of component integrity information. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *ComponentIntegrity*. See the ComponentIntegrity schema for details.
}			
CompositionService *(v1.2+)* {}	object		The link to the composition service. See the *CompositionService* schema for details on this property.

Property	Type	Attributes	Notes
EventService {}	object		The link to the event service. See the *EventService* schema for details on this property.
Fabrics *(v1.1+)* {	object		The link to a collection of fabrics. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Fabric*. See the Fabric schema for details.
}			
Facilities *(v1.6+)* {	object		The link to a collection of facilities. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Facility*. See the Facility schema for details.
}			
JobService *(v1.4+)* {}	object		The link to the job service. See the *JobService* schema for details on this property.
JsonSchemas {	object		The link to a collection of JSON Schema files. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *JsonSchemaFile*. See the JsonSchemaFile schema for details.
}			
KeyService *(v1.11+)* {}	object		The link to the key service. See the *KeyService* schema for details on this property.
LicenseService *(v1.12+)* {}	object		The link to the license service. See the *LicenseService* schema for details on this property.
Links {	object	*required*	The links to other resources that are related to this resource.
ManagerProvidingService *(v1.15+)* {}	object		The link to the manager that is providing this Redfish service. See the *Manager* schema for details on this property.
Oem {}	object		The OEM extension property. See the *Resource* schema for details on this property.
Sessions {	object	*required*	The link to a collection of sessions. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Session*. See the Session schema for details.
}			
}			
Managers {	object		The link to a collection of managers. Contains a link to a resource.

Property	Type	Attributes	Notes
@odata.id	string	*read-only*	Link to Collection of *Manager*. See the Manager schema for details.
}			
NVMeDomains *(v1.10+)* {}	object		The link to a collection of NVMe domains.
PowerEquipment *(v1.6+)* {}	object		The link to a set of power equipment. See the *PowerEquipment* schema for details on this property.
Product *(v1.3+)*	string	*read-only* *(null)*	The product associated with this Redfish service.
ProtocolFeaturesSupported *(v1.3+)* {	object		The information about protocol features that the service supports.
DeepOperations *(v1.7+)* {	object		The information about deep operations that the service supports.
DeepPATCH *(v1.7+)*	boolean	*read-only*	An indication of whether the service supports the deep PATCH operation.
DeepPOST *(v1.7+)*	boolean	*read-only*	An indication of whether the service supports the deep POST operation.
MaxLevels *(v1.7+)*	integer	*read-only*	The maximum levels of resources allowed in deep operations.
}			
ExcerptQuery *(v1.4+)*	boolean	*read-only*	An indication of whether the service supports the excerpt query parameter.
ExpandQuery *(v1.3+)* {	object		The information about the use of $expand in the service.
ExpandAll *(v1.3+)*	boolean	*read-only*	An indication of whether the service supports the asterisk (`*`) option of the $expand query parameter.
Levels *(v1.3+)*	boolean	*read-only*	An indication of whether the service supports the $levels option of the $expand query parameter.
Links *(v1.3+)*	boolean	*read-only*	An indication of whether this service supports the tilde (`~`) option of the $expand query parameter.
MaxLevels *(v1.3+)*	integer	*read-only*	The maximum $levels option value in the $expand query parameter.
NoLinks *(v1.3+)*	boolean	*read-only*	An indication of whether the service supports the period (`.`) option of the $expand query parameter.
}			

Property	Type	Attributes	Notes
FilterQuery *(v1.3+)*	boolean	*read-only*	An indication of whether the service supports the $filter query parameter.
MultipleHTTPRequests *(v1.14+)*	boolean	*read-only*	An indication of whether the service supports multiple outstanding HTTP requests.
OnlyMemberQuery *(v1.4+)*	boolean	*read-only*	An indication of whether the service supports the only query parameter.
SelectQuery *(v1.3+)*	boolean	*read-only*	An indication of whether the service supports the $select query parameter.
}			
RedfishVersion	string	*read-only*	The version of the Redfish service.
RegisteredClients *(v1.13+)* {	object		The link to a collection of registered clients. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *RegisteredClient*. See the RegisteredClient schema for details.
}			
Registries {	object		The link to a collection of registries. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *MessageRegistryFile*. See the MessageRegistryFile schema for details.
}			
ResourceBlocks *(v1.5+)* {	object		The link to a collection of resource blocks. This collection is intended for implementations that do not contain a composition service but that expose resources to an orchestrator that implements a composition service. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *ResourceBlock*. See the ResourceBlock schema for details.
}			
ServiceConditions *(v1.13+)* {}	object		The link to the service conditions. See the *ServiceConditions* schema for details on this property.
ServiceIdentification *(v1.14+)*	string	*read-only*	The vendor or user-provided product and service identifier.
SessionService {}	object		The link to the sessions service. See the *SessionService* schema for details on this property.

Property	Type	Attributes	Notes
Storage *(v1.9+)* {	object		The link to a collection of storage subsystems. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Storage*. See the Storage schema for details.
}			
StorageServices *(v1.1+)* {}	object		The link to a collection of storage services.
StorageSystems *(v1.1+)* {}	object		The link to a collection of storage systems.
Systems {	object		The link to a collection of systems. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *ComputerSystem*. See the ComputerSystem schema for details.
}			
Tasks {}	object		The link to the task service. See the *TaskService* schema for details on this property.
TelemetryService *(v1.4+)* {}	object		The link to the telemetry service. See the *TelemetryService* schema for details on this property.
ThermalEquipment *(v1.16+)* {	object		The link to a set of cooling equipment. See the *ThermalEquipment* schema for details on this property.
@odata.id	string	*read-only*	Link to a ThermalEquipment resource. See the Links section and the *ThermalEquipment* schema for details.
}			
UpdateService *(v1.1+)* {}	object		The link to the update service. See the *UpdateService* schema for details on this property.
UUID	string (uuid)	*read-only* *(null)*	Unique identifier for a service instance. When SSDP is used, this value contains the same UUID returned in an HTTP `200 OK` response from an SSDP `M-SEARCH` request during discovery.
Vendor *(v1.5+)*	string	*read-only* *(null)*	The vendor or manufacturer associated with this Redfish service.

4.13.4 Property details

4.13.4.1 idRef

@odata.id	string (URI)	*read-only*	The unique identifier for a resource.

4.13.5 Example response


```
{
    "@odata.type": "#ServiceRoot.v1_15_0.ServiceRoot",
    "Id": "RootService",
    "Name": "Root Service",
    "RedfishVersion": "1.15.0",
    "UUID": "92384634-2938-2342-8820-489239905423",
    "Product": "UR99 1U Server",
    "ProtocolFeaturesSupported": {
        "ExpandQuery": {
            "ExpandAll": true,
            "Levels": true,
            "MaxLevels": 6,
            "Links": true,
            "NoLinks": true
        },
        "SelectQuery": false,
        "FilterQuery": false,
        "OnlyMemberQuery": true,
        "ExcerptQuery": true,
        "MultipleHTTPRequests": true
    },
    "ServiceConditions": {
        "@odata.id": "/redfish/v1/ServiceConditions"
    },
    "Systems": {
        "@odata.id": "/redfish/v1/Systems"
    },
    "Chassis": {
        "@odata.id": "/redfish/v1/Chassis"
    },
    "Managers": {
        "@odata.id": "/redfish/v1/Managers"
    },
    "UpdateService": {
        "@odata.id": "/redfish/v1/UpdateService"
    },
    "CompositionService": {
```

```
        "@odata.id": "/redfish/v1/CompositionService"
    },
    "Tasks": {
        "@odata.id": "/redfish/v1/TaskService"
    },
    "SessionService": {
        "@odata.id": "/redfish/v1/SessionService"
    },
    "AccountService": {
        "@odata.id": "/redfish/v1/AccountService"
    },
    "EventService": {
        "@odata.id": "/redfish/v1/EventService"
    },
    "Links": {
        "Sessions": {
            "@odata.id": "/redfish/v1/SessionService/Sessions"
        }
    },
    "@odata.id": "/redfish/v1/"
}
```


4.14 ThermalEquipment 1.0.0

Version	*v1.0*
Release	2023.1

4.14.1 Description

This is the schema definition for the set of cooling equipment.

4.14.2 URIs

/redfish/v1/ThermalEquipment

4.14.3 Properties

Property	Type	Attributes	Notes
CDUs {	object		A link to a collection of cooling distribution units. Contains a link to a resource.

Property	Type	Attributes	Notes
@odata.id	string	*read-only*	Link to Collection of *CoolingUnit*. See the CoolingUnit schema for details.
}			
CoolingLoops {	object		A link to a collection of cooling loops. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolingLoop*. See the CoolingLoop schema for details.
}			
HeatExchangers {	object		A link to a collection of heat exchanger units. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolingUnit*. See the CoolingUnit schema for details.
}			
ImmersionUnits {	object		A link to a collection of immersion cooling units. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolingUnit*. See the CoolingUnit schema for details.
}			
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.

4.14.4 Example response


```
{
    "@odata.type": "#ThermalEquipment.v1_0_0.ThermalEquipment",
    "Id": "ThermalEquipment",
    "Name": "Cooling Equipment",
    "Status": {
        "State": "Enabled",
        "HealthRollup": "OK"
    },
    "CDUs": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CDUs"
    },
    "CoolingLoops": {
        "@odata.id": "/redfish/v1/ThermalEquipment/CoolingLoops"
    },
    "@odata.id": "/redfish/v1/ThermalEquipment",
    "@Redfish.Copyright": "Copyright 2014-2021 DMTF. For the full DMTF copyright policy, see http://www.dmtf.org/ab
}
```

4.15 ThermalMetrics 1.2.0

Version	*v1.2*	*v1.1*	*v1.0*
Release	2023.1	2022.3	2020.4

4.15.1 Description

The ThermalMetrics schema represents the thermal metrics of a chassis.

4.15.2 URIs

/redfish/v1/Chassis/*{ChassisId}*/ThermalSubsystem/ThermalMetrics

4.15.3 Properties

Property	Type	Attributes	Notes
AirFlowCubicMetersPerMinute *(v1.2+)* {}	object		The air flow through the chassis (m^3/min). For more information about this property, see SensorExcerpt in Property Details.
DeltaPressurekPa *(v1.2+)* {}	object		The differential pressure (kPa). For more information about this property, see SensorExcerpt in Property Details.
HeaterSummary *(v1.1+)* {	object	*(null)*	The summary of heater metrics for this chassis.
TotalPrePowerOnHeatingTimeSeconds *(v1.1+)*	integer	*read-only* *(null)*	The total number of seconds all the heaters in the thermal subsystem were active while the respective devices they heat were powered off.
TotalRuntimeHeatingTimeSeconds *(v1.1+)*	integer	*read-only* *(null)*	The total number of seconds all the heaters in the thermal subsystem were active while the respective devices they heat were powered on.
}			
TemperatureReadingsCelsius [{	array (excerpt)		The temperatures (Celsius) from all related sensors for this device. This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.

Property	Type	Attributes	Notes
DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
DeviceName *(v1.2+)*	string	*read-only (null)*	The name of the device.
PhysicalContext	string (enum)	*read-only (null)*	The area or device to which this sensor measurement applies. *For the possible property values, see PhysicalContext in Property details.*
PhysicalSubContext	string (enum)	*read-only (null)*	The usage or location within a device to which this sensor measurement applies. *For the possible property values, see PhysicalSubContext in Property details.*
Reading	number	*read-only (null)*	The sensor value.
}]			
TemperatureSummaryCelsius {	object	*(null)*	The summary temperature readings for this chassis.
Ambient {}	object		The ambient temperature (Celsius) of this subsystem. For more information about this property, see SensorExcerpt in Property Details.
Exhaust {}	object		The exhaust temperature (Celsius) of this subsystem. For more information about this property, see SensorExcerpt in Property Details.
Intake {}	object		The intake temperature (Celsius) of this subsystem. For more information about this property, see SensorExcerpt in Property Details.
Internal {}	object		The internal temperature (Celsius) of this subsystem. For more information about this property, see SensorExcerpt in Property Details.
}			

4.15.4 Actions

4.15.4.1 ResetMetrics

Description

This action resets the summary metrics related to this equipment.

Action URI

{Base URI of target resource}/Actions/ThermalMetrics.ResetMetrics

Action parameters

This action takes no parameters.

4.15.5 Property details

4.15.5.1 PhysicalContext

The area or device to which this sensor measurement applies.

string	Description
Accelerator	An accelerator.
ACInput	An AC input.
ACMaintenanceBypassInput	An AC maintenance bypass input.
ACOutput	An AC output.
ACStaticBypassInput	An AC static bypass input.
ACUtilityInput	An AC utility input.
ASIC	An ASIC device, such as a networking chip or chipset component.
Back	The back of the chassis.
Backplane	A backplane within the chassis.
Battery	A battery.
Board	A circuit board.
Chassis	The entire chassis.
ComputeBay	Within a compute bay.
CoolingSubsystem	The entire cooling, or air and liquid, subsystem.
CPU	A processor (CPU).
CPUSubsystem	The entire processor (CPU) subsystem.
DCBus	A DC bus.

string	Description
Exhaust	The air exhaust point or points or region of the chassis.
ExpansionBay	Within an expansion bay.
Fan	A fan.
FPGA	An FPGA.
Front	The front of the chassis.
GPU	A graphics processor (GPU).
GPUSubsystem	The entire graphics processor (GPU) subsystem.
Intake	The air intake point or points or region of the chassis.
LiquidInlet	The liquid inlet point of the chassis.
LiquidOutlet	The liquid outlet point of the chassis.
Lower	The lower portion of the chassis.
Memory	A memory device.
MemorySubsystem	The entire memory subsystem.
Motor	A motor.
NetworkBay	Within a networking bay.
NetworkingDevice	A networking device.
PowerSubsystem	The entire power subsystem.
PowerSupply	A power supply.
PowerSupplyBay	Within a power supply bay.
Pump	A pump.
Rectifier	A rectifier device.
Room	The room.
StorageBay	Within a storage bay.
StorageDevice	A storage device.
SystemBoard	The system board (PCB).
Transceiver	A transceiver.

string	Description
Transformer	A transformer.
TrustedModule	A trusted module.
Upper	The upper portion of the chassis.
VoltageRegulator	A voltage regulator device.

4.15.5.2 PhysicalSubContext

The usage or location within a device to which this sensor measurement applies.

string	Description
Input	The input.
Output	The output.

4.15.5.3 SensorExcerpt

The Sensor schema describes a sensor and its properties. This object is an excerpt of the *Sensor* resource located at the URI shown in DataSourceUri.

DataSourceUri	string (URI)	*read-only (null)*	The link to the resource that provides the data for this sensor.
Reading	number	*read-only (null)*	The sensor value.

4.15.6 Example response

```
{
    "@odata.type": "#ThermalMetrics.v1_1_0.ThermalMetrics",
    "Id": "ThermalMetrics",
    "Name": "Chassis Thermal Metrics",
    "TemperatureSummaryCelsius": {
        "Internal": {
            "Reading": 39,
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/CPU1Temp"
```

```
        },
        "Intake": {
            "Reading": 24.8,
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/IntakeTemp"
        },
        "Ambient": {
            "Reading": 22.5,
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/AmbientTemp"
        },
        "Exhaust": {
            "Reading": 40.5,
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/ExhaustTemp"
        }
    },
    "TemperatureReadingsCelsius": [
        {
            "Reading": 40,
            "DeviceName": "SystemBoard",
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/SysBrdTemp"
        },
        {
            "Reading": 24.8,
            "DeviceName": "Intake",
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/IntakeTemp"
        },
        {
            "Reading": 39,
            "DeviceName": "CPUSubsystem",
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/CPUTemps"
        },
        {
            "Reading": 42,
            "DeviceName": "MemorySubsystem",
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/MemoryTemp"
        },
        {
            "Reading": 33,
            "DeviceName": "PowerSupply",
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/PSTemp"
        },
        {
            "Reading": 40.5,
            "DeviceName": "Exhaust",
            "DataSourceUri": "/redfish/v1/Chassis/1U/Sensors/ExhaustTemp"
        }
    ],
    "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/ThermalMetrics"
}
```

4.16 ThermalSubsystem 1.2.0

Version	*v1.2*	*v1.1*	*v1.0*
Release	2023.1	2022.3	2020.4

4.16.1 Description

This ThermalSubsystem schema contains the definition for the thermal subsystem of a chassis.

4.16.2 URIs

/redfish/v1/Chassis/*{ChassisId}*/ThermalSubsystem

4.16.3 Properties

Property	Type	Attributes	Notes
CoolantConnectors *(v1.2+)* {	object		A link to the coolant connectors for this equipment. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *CoolantConnector*. See the CoolantConnector schema for details.
}			
FanRedundancy [{ }]	array (object)		The redundancy information for the groups of fans in this subsystem. See the *v1_4_1.v1_4_1* schema for details on this property.
Fans {	object		The link to the collection of fans within this subsystem. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Fan*. See the Fan schema for details.
}			
Heaters *(v1.1+)* {	object		The link to the collection of heaters within this subsystem. Contains a link to a resource.
@odata.id	string	*read-only*	Link to Collection of *Heater*. See the Heater schema for details.
}			
Status {}	object		The status and health of the resource and its subordinate or dependent resources. See the *Resource* schema for details on this property.

Property	Type	Attributes	Notes
ThermalMetrics {	object		The link to the summary of thermal metrics for this subsystem. See the *ThermalMetrics* schema for details on this property.
@odata.id	string	*read-only*	Link to a ThermalMetrics resource. See the Links section and the *ThermalMetrics* schema for details.
}			

4.16.4 Example response


```
{
    "@odata.type": "#ThermalSubsystem.v1_1_0.ThermalSubsystem",
    "Id": "ThermalSubsystem",
    "Name": "Thermal Subsystem for Chassis",
    "FanRedundancy": [
        {
            "RedundancyType": "NPlusM",
            "MaxSupportedInGroup": 2,
            "MinNeededInGroup": 1,
            "RedundancyGroup": [
                {
                    "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/Fans/Bay1"
                },
                {
                    "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/Fans/Bay2"
                }
            ],
            "Status": {
                "State": "Enabled",
                "Health": "OK"
            }
        },
        {
            "RedundancyType": "NPlusM",
            "MaxSupportedInGroup": 2,
            "MinNeededInGroup": 1,
            "RedundancyGroup": [
                {
                    "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/Fans/CPU1"
                },
                {
                    "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/Fans/CPU2"
                }
            ],
            "Status": {
                "State": "Disabled"
            }
```

```
        }
    ],
    "Fans": {
        "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/Fans"
    },
    "ThermalMetrics": {
        "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem/ThermalMetrics"
    },
    "Status": {
        "State": "Enabled",
        "Health": "OK"
    },
    "@odata.id": "/redfish/v1/Chassis/1U/ThermalSubsystem"
}
```

5 Redfish documentation generator

This document was created using the Redfish Documentation Generator utility, which uses the contents of the Redfish schema files (in JSON schema format) to automatically generate the bulk of the text. The source code for the utility is available for download at the DMTF's Github repository located at http://www.github.com/DMTF/Redfish-Tools.