



Swordfish Scalable Storage Management API Specification

Version 1.0.6

ABSTRACT: The Swordfish Scalable Storage Management API defines a RESTful interface and a standardized data model to provide a scalable, customer-centric interface for managing storage and related data services.

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SNIA Technical Position

Date: 25 May 2018

USAGE

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Revision History

Date	Revision	Notes
19 September 2016	1.0.0	Initial Release
12 October 2016	1.0.1	Errata release for general clean up and formatting consistency
1 November 2016	1.0.2	Errata release to change multiple collections' types from collections (arrays) to ResourceCollections to conform to Redfish usage guidelines Change multiple collections' types from collections (arrays) to ResourceCollections to conform to Redfish usage guidelines and move NavigationProperties from Links section.
24 January 2017	1.0.3	Errata release to move complex types and enum to versioned namespace Schedule schema: add property json schema fix (Swordfish to swordfish) Specification enhancements, multiple areas User's guide: multiple new use cases and new document section
25 April 2017	1.0.4	Errata release with minor updates to schema: move FileShare collection, integrate DMTF and SNIA versions of Volume, fix incorrect property references and update descriptions. Update mockups. User's guide: Update cross-references.
3 October 2017	1.0.5	Errata release to include schema simplifications and other lessons from initial implementations, as well as general cleanup of specification.

Date	Revision	Notes
13 February 2018	1.0.6	Updated Storage Systems model – added notion of Integrated Service Configuration in addition to (and named) Hosted Service Configuration Added ComplexType common definition section Added/updated common Redfish property definitions Updates to conform to new SNIA templates.
25 May 2018	1.0.6	Published as a SNIA Technical Position

Current Revision

SNIA is actively engaged in expanding and refining the Swordfish specification. The most current revision can be found on the SNIA web site at https://www.snia.org/tech_activities/standards/curr_standards/swordfish.

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INTENDED AUDIENCE

This document is intended for use by individuals and companies engaged in storage management.

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1 Abstract

The Swordfish Scalable Storage Management API ("Swordfish") defines a RESTful interface and a standardized data model to provide a scalable, customer-centric interface for managing storage and related data services. It extends the Redfish Scalable Platforms Management API Specification (DSP0266) from the DMTF.

2 Scope

Swordfish extends the Redfish Scalable Platforms Management API Specification to define a comprehensive, RESTful API for storage management that addresses block storage, file systems, object storage, and storage network infrastructure. It is centered around common operational and business concerns of storage management, including:

- Configuration and provisioning
- Monitoring
- Event and log management
- Performance assessment
- Diagnostics
- Fault detection and remediation
- Security
- Accounting and resource consumption

Swordfish's storage model is built around well-defined classes of service, which provide a means to map high-level business goals and objectives to specific, storage-based actions and requirements, in a clear and consistent way that can be applied uniformly across a broad spectrum of storage configurations and storage types (e.g., block storage, file systems, object stores). Common storage management functionality covered by class of service includes snapshots, replication, mapping and masking, and provisioning.

The Redfish specification provides the protocols and a core set of data models and behaviors for the management of systems. It defines the elements and behaviors that are mandatory for all Redfish implementations. Additionally it defines additional elements and behaviors that can be chosen by system vendors or manufacturers. The specifications also defines points at which OEM (system vendor) extensions can be provided by a given implementation. The specifications specifies normative requirements for Redfish Services and associated materials, such as Redfish Schema files. The Redfish specifications does not set requirements for Redfish clients, but will indicate what a Redfish client should do in order to access and utilize a Redfish Service successfully and effectively.

The Swordfish specification defines additional data models and behaviors for the management of storage systems and storage infrastructure. A Swordfish implementation shall conform to all requirements specified in the Redfish specifications.

Swordfish is suitable for a wide range of storage, from small-scale object drives, integrated RAID cards or RBODs providing storage services, to external disk arrays or file servers, to infrastructure providing storage services for converged, hyperscale and large scale cloud environments.

This document defines the Swordfish Scalable Storage Management API.

3 Normative References

3.1 Overview

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

3.2 Approved references

Table 1: Approved normative references

Tag	Title (Version)	Author	URL

Tag	Title (Version)	Author	URL
ISO-8601	Data elements and interchange formats -- Information interchange -- Representation of dates and times -- Part 1: Basic rules	ISO/IEC	http://www.iso.org/iso/home/store/catalogue_ics/catalogue_detail_ics.htm?csnumber=70907
ISO-Direct	ISO/IEC Directives, Part 2 Principles and rules for the structure and drafting of ISO and IEC documents (Seventh Edition, 2016)	ISO/IEC	http://isotc.iso.org/livelink/livelink/fetch/2000/2122/4230450/4230456/ISO_IEC_Directives_Part_2_Principles_and_rules_for_the_structure_and_drafting_of_ISO_and_IEC_documents_-_2016%287th_edition%29_-_PDF.pdf?nodeid=17667902&vernum=-2
Redfish	Redfish Scalable Platforms Management API Specification (v1.4.0)	DMTF	http://www.dmtf.org/sites/default/files/standards/documents/DSP0266_1.4.0.pdf
OData	Open Data Protocol (v. 4.0)	OASIS	https://www.oasis-open.org/standards#odatav4.0
RFC3986	Uniform Resource Identifier (URI): Generic Syntax (2005)	The Internet Society	http://www.rfc-base.org/txt/rfc-3986.txt
CSDL	Common Schema Definition Language (4.0)	OASIS	http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.html
ITIL	ITIL Glossary (2011)	ITIL	https://www.axelos.com/Corporate/media/Files/Glossaries/ITIL_2011_Glossary_GB-v1-0.pdf
Units	The Unified Code for Units of Measure (v2.0.1)	Regenstrief Institute, Inc. and the UCUM Organization	http://unitsofmeasure.org/trac
TLS	Transport Layer Security (TLS) Protocol Version 1.2	IETF	https://www.ietf.org/rfc/rfc5246.txt
SPC-4	SCSI Primary Commands - 4 (SPC-4) INCITS 513-2015	T10	http://www.techstreet.com/cgi-bin/joint.cgi/incits

3.3 References under development

Documents referenced in this section are under active development, and subject to revision or replacement at any time. In the event that the provided URL is no longer valid, refer to the related parent page to locate a replacement.

Table 2: References under development

Tag	Title (Version)	Author	URL	Parent Page
RedfishResource	Redfish Resource and Schema Guide	DMTF	http://www.dmtf.org/sites/default/files/standards/documents/DSP2046_2017.0a.pdf	http://www.dmtf.org/redfish

3.4 Other references

None defined in this document.

4 Terms and Definitions

4.1 Overview

In this document, some terms have a specific meaning beyond the normal English meaning. Those terms are defined in this clause. New terms, frequently used Redfish terms.

4.2 Swordfish-specific Terms

4.2.1 Definitions

The following terms are used in this document.

Table 2: Swordfish terms

Term	Definition
Entity	An element in a model that represents resources. The element may be either a type declaration or a model instance representing an instance of the resource.
Entity Instance	A model element that represents the information and behaviors of a particular instance of an entity.
Entity Type	A model element that specifies the structure, information and behaviors of an entity.
Instance	See Entity Instance.
OData service	A REST-based service that allows resources, identified using Uniform Resource Locators (URLs) and defined in a model, to be published and edited by Web clients using simple HTTP messages.
Metamodel	A model that defines the semantics for the construction of a model.
Model	A set of entities and the relationships between them that define the semantics, behavior and state of that set.
Resource	A named item of interest. The item may be a collection of other items. A resource may be assigned a URI that allows it to receive and process messages. A particular instance of a resource is represented in the model by an entity instance. The type of a resource is represented in the model by an entity type.
Schema	A formal language representation of a model that conforms to a metamodel.
Service Document	The term Service Document is used to refer to a particular resource that is directly accessed via the OData service entry point. This resource serves as a starting point for locating and accessing the other resources and associated metadata that together make up an instance of a Swordfish Service. See also OData Service Document
Swordfish service	A service that is a Redfish service and that implements Swordfish extensions to the Redfish model that conform to the requirements of this document.

4.2.2 Symbols and abbreviated terms

None in this document.

4.3 Reference to Redfish terms

Many terms in this document were originally defined in the [Redfish Specification](#). Some of the more common terms and definitions are reproduced here, as an aid to the reader.

Table 3: Redfish terms

Term	Definition (as of 24 January 2017)
OData	The Open Data Protocol, as defined in OData-Protocol .
OData Service Document	The name for a resource that provides information about the Service Root. The Service Document provides a standard format for enumerating the resources exposed by the service that enables generic hypermedia-driven OData clients to navigate to the resources of the Redfish Service. See also Service Document
Redfish Schema	The CSDL definition of Redfish resources.
Redfish service	An OData service that conforms to requirements of the Redfish specification .
Redfish Service Entry Point	Also referred to as "Service Entry Point". An URI through which a particular instance of a Redfish Service is accessed. A Redfish Service may have more than one Service Entry Point
Request	A message from a Client to a Server. It consists of a request line (which includes the Operation), request headers, an empty line and an optional message body.
Service Root	The term Service Root is used to refer to a particular resource that is directly accessed via the Redfish service entry point. This resource serves as a starting point for locating and accessing the other resources and associated metadata that together make up an instance of a Redfish Service.

4.4 Keywords (normative language terms)

This document conforms to [ISO/IEC Directives, Part 2](#) for keyword usage. The most common terms and their intended meanings are summarized below.

Table 4: Normative language terms

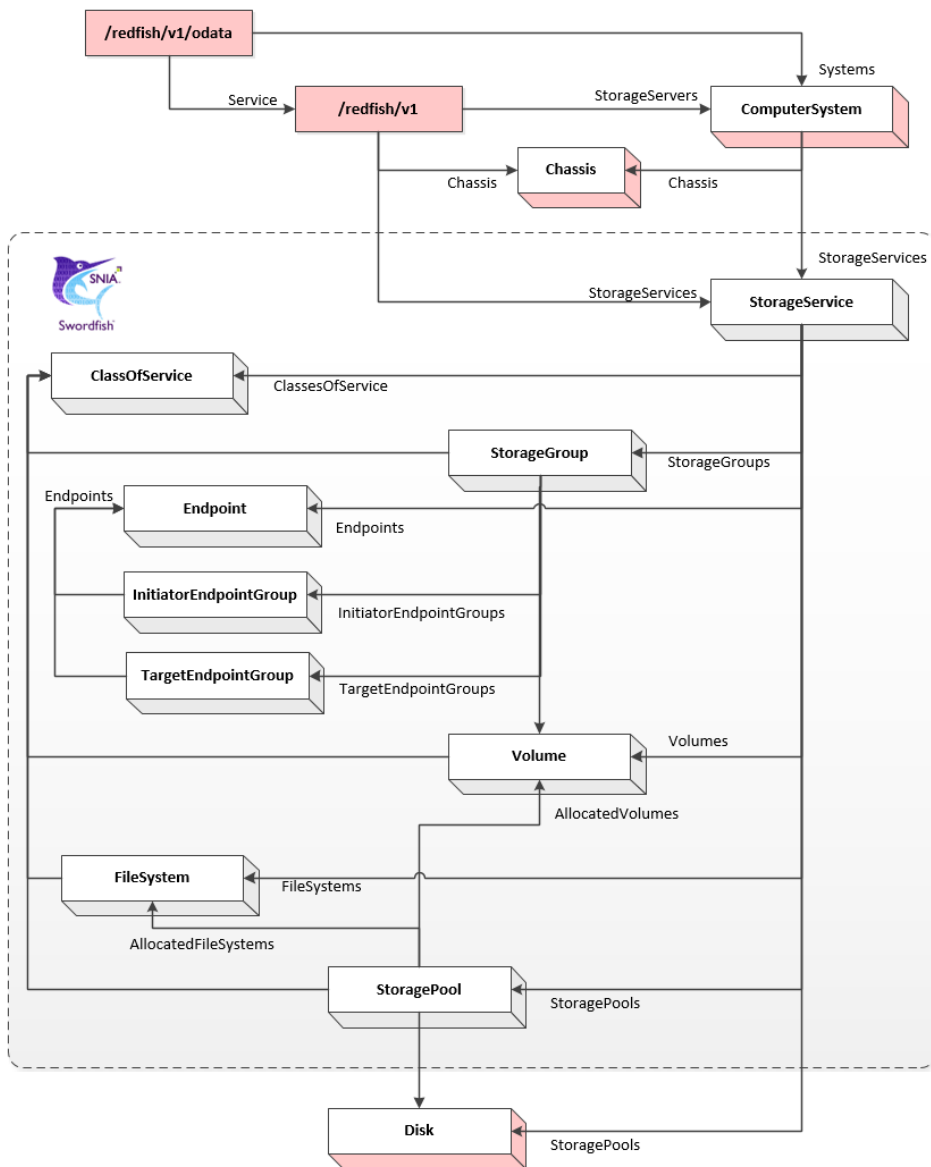
Term(s)	Meaning
shall / shall not	Used to identify objectively verifiable criteria to be fulfilled and from which no deviation is permitted if compliance with the document is to be claimed
should / should not	Used to identify a suggested possible choice or course of action deemed to be particularly suitable without necessarily mentioning or excluding others
may / need not	Used to convey consent or liberty (or opportunity) to do something
can / cannot	Expected or conceivable material, physical or causal outcome
must	Identifies a constraint or obligation on the user of the document, typically due to one or more legal requirements or laws of nature, that is not stated as a provision of the standard <i>NB: "must" is not an alternative for "shall", and should only be used for constraints that arise from outside this standard</i>

5 Swordfish Overview

5.1 Introduction

The Swordfish Scalable Storage Management API ("Swordfish") defines a RESTful interface and a standardized data model to provide a scalable, customer-centric interface for managing storage and related data services. It extends the Redfish Scalable Platforms Management API Specification (DSP0266) from the DMTF.

5.2 Relation to Redfish



The Swordfish service interface extends the Redfish service interface. As such, a Swordfish service is a Redfish service and includes all required elements of the Redfish model.

Storage systems managed by the Swordfish storage service are located in the *ServiceRoot* (and *ServiceContainer*) via the *StorageSystems* resource collection. They are modeled using Redfish *ComputerSystems*. The physical infrastructure is modeled using Redfish *Chassis*.

Each Swordfish *StorageService* is located in the *ServiceRoot* (and *ServiceContainer*) via the *StorageServices* resource collection. All Swordfish defined instances are located through *StorageService* instances. A Swordfish management client may focus entirely on entities defined by the Swordfish schema.

The combined Redfish and Swordfish models defines information requirements and constraints on the values that are used as input or output of the operations supported by the Swordfish interface. The Swordfish interface relies on the operations specified by the OData REST protocol ([#normative-references](#)). Additional operations (known as Actions) are also defined by the model. The information content is defined by a schema specified using the Common Schema Definition Language (CSDL) ([#normative-references](#)) defined by the OData organization within OASIS (<https://www.oasis-open.org/>).

Each Swordfish service is accessed via well known URLs on the system supporting the Swordfish Service. Since Swordfish is an extension of Redfish, these URLs are the same as for accessing the Redfish defined aspects of the service.

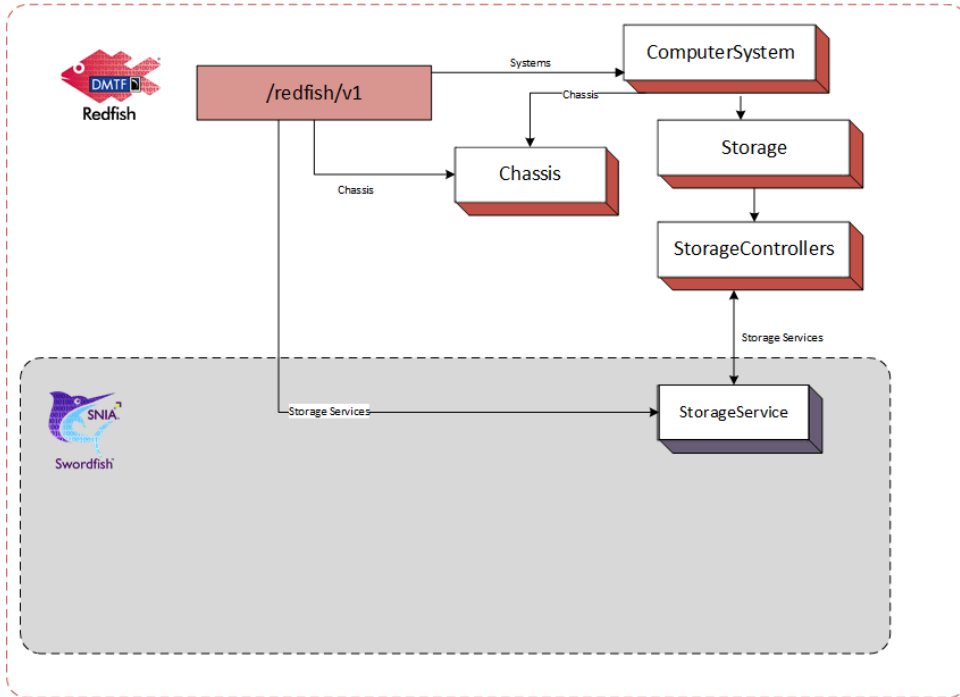
5.2.1 Storage System Models

Swordfish has been designed to support a broad range of configurations, requirements, size and complexity, as well as logical and physical architectures. As a result, there are two primary methods of modelling the storage system for a Swordfish implementation. Either model choice results in the same storage service, regardless of the storage system model.

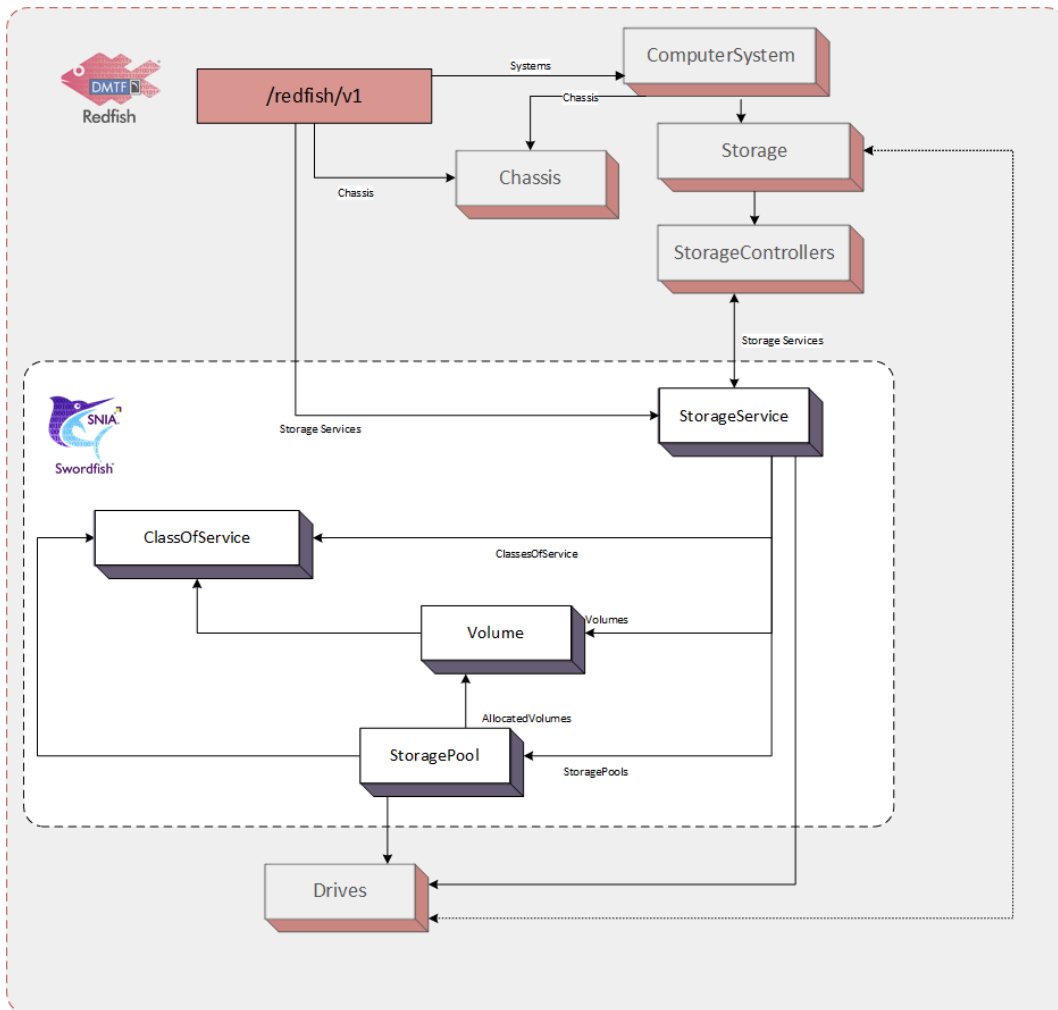
1. Integrated Service Configuration

The storage systems managed by the Swordfish storage service are modeled using the Redfish *Storage* resource and *StorageController* resource collections. The

Storage resource is located in the Redfish hierarchy contained by ComputerSystems, typically running as ApplicationServers. The physical infrastructure is modeled using Redfish Chassis.

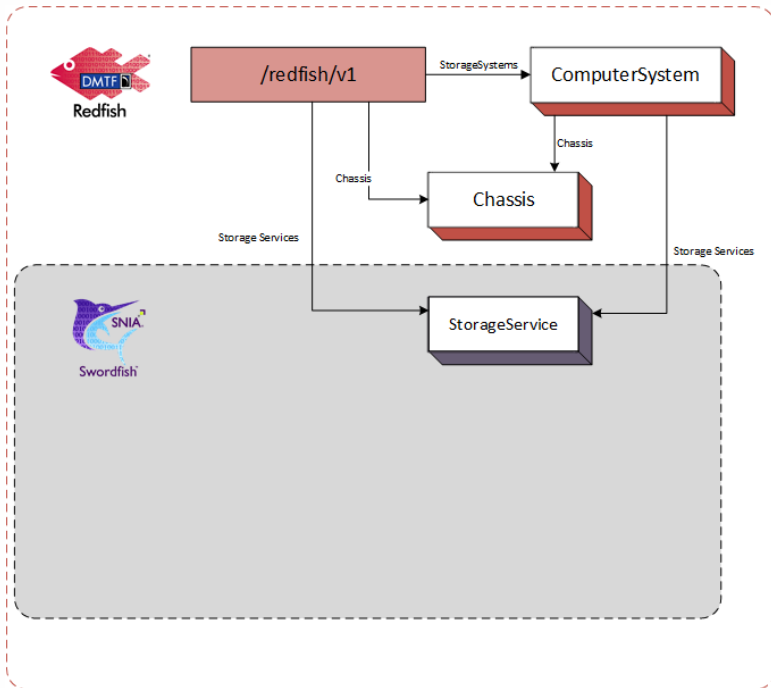


This configuration works well when the storage service is hosted by a storage resource within a computer system. An example of a Storage Service for an integrated service configuration is shown below.

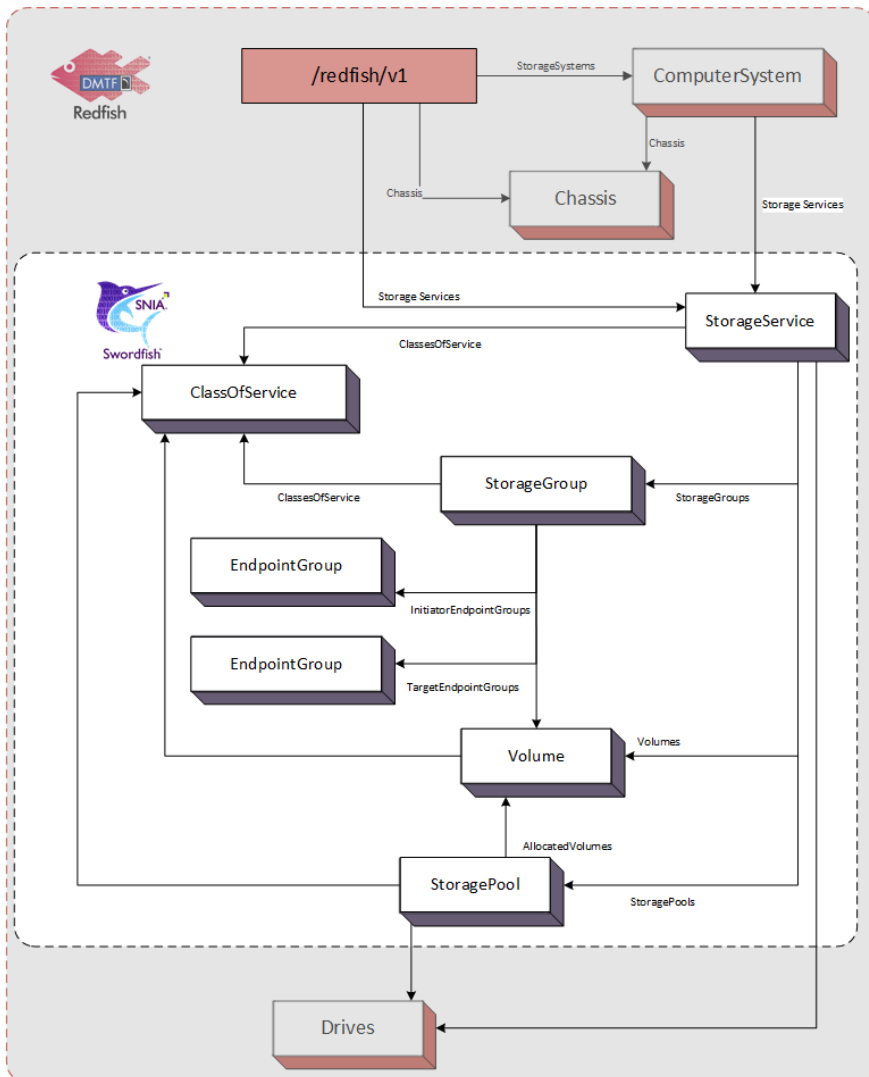


2. Hosted Service Configuration

The storage systems managed by the Swordfish storage service are located in the ServiceRoot (and ServiceContainer) via the StorageSystems resource collection. They are modeled using Redfish ComputerSystems. The physical infrastructure is modeled using Redfish Chassis.



This configuration works well when the storage system hosts the storage service directly. An example of a Storage Service for a hosted service configuration is shown below.



5.2.2 The ServiceRoot and ServiceContainer entities

5.2.2.1 Overview

A **GET** of `/redfish/v1` will return the `ServiceRoot` entity. A **GET** of `/redfish/v1/odata` will return the `ServiceContainer` instances that represents the OData service document. Each of these instances provides links to the remainder of the system.

The following are the elements utilized for Swordfish management.

- `Systems`: A reference to a `Systems` resource collection;
- `Chassis`: A reference to a `Chassis` resource collection;
- `StorageSystems`: A reference to a `StorageSystems` resource collection;
- `StorageServices`: A reference to a `StorageServices` resource collection.

5.2.2.2 The Systems resource collection

A resource collection that references a set of `ComputerSystem` resources that each represents a general purpose application server. Each `ComputerSystem` resource will have an entry with the value of "ApplicationServer" in its `HostingRoles` property. A particular `ComputerSystem` resource can be in both the `StorageSystems` collection and the `Systems` collection.

5.2.2.3 The Chassis resource collection

A resource collection that references a set of `Chassis` resources. Each `Chassis` resource represents physical containers, (i.e. sheet-metal confined spaces and logical zones like racks, enclosures, chassis and all other containers). Subsystems (like sensors), which operate outside of a system's data plane (meaning the resources are not accessible to software running on the system) are linked either directly or indirectly through this resource.

5.2.2.4 The StorageSystems resource collection

A reference to a `ComputerSystemCollection` with members of type `ComputerSystem` that support storage services. These `ComputerSystem` resources represent systems that support Swordfish storage management services. They will have an entry with the value of "StorageServer" in their `HostingRoles` property. A resource collection that references a set of `ComputerSystem` resources that each represents a storage server. Each `ComputerSystem` resource will have an entry with the value of "StorageServer" in its `HostingRoles` property. A particular `ComputerSystem` resource can be a member of both the `StorageSystems` resource collection and the `Systems` resource collection.

5.2.2.5 The StorageServices resource collection

A reference to a `StorageServiceCollection` with members that are of type `StorageService`. A resource collection that references a set of `StorageService` resources. Each `StorageService` resource represents the resources and behaviors supported by that storage service.

5.3 Storage Services

5.3.1 The StorageService resource

The storage service is hosted on a storage system and exposes logical storage, associated resources and related functionality. Storage service resources can be found in the service root or service container via the `StorageServices` resource collection.

The following are the principal properties of `StorageService` that point to resources managed or defined by the storage service:

- `ClassesOfService`: A reference to a resource collection that specifies the supported `ClassOfService` resources.
- `ClientEndpointGroups`: A reference to a resource collection that collects `ClientEndpointGroup` resources.
- `Drives`: A reference to a resource collection that collects `Drive` resources used for storage.
- `Enclosures`: A reference to a resource collection that collects `Chassis` resources that contain storage related resources.
- `Endpoints`: A reference to a resource collection that collects `Endpoint` resources used to access storage.
- `FileSystems`: A reference to a resource collection that collects `FileSystem` resources.
- `ServerEndpointGroups`: A reference to a resource collection that collects `ServerEndpointGroup` resources.
- `StorageGroups`: A reference to a resource collection that collects `StorageGroup` resources.
- `StoragePools`: A reference to a resource collection that collects `StorageGroup` resources.
- `Volumes`: A reference to a resource collection that collects `Volume` resources.
- `HostingSystem`: A reference to the `ComputerSystem` instance that hosts this `StorageService`.

The following properties each include a set of attributes that each describe a range of capabilities that the storage service can support for a particular kind of service.

- `DataProtectionLoSCapabilities`: Replicas that protects data from loss.
- `DataSecurityLoSCapabilities`: Data security service level requirements. The data security characteristics enable the storage system to be used in an environment where compliance with an externally-specified security standard or standards is required. Examples of such standards include FIPS-140, HIPAA and PCI.
- `DataStorageLoSCapabilities`: Provisioning and access characteristics for storage of the data.
- `IOConnectivityLoSCapabilities`: IO connectivity requirements for access to the data.
- `IOPerformanceLoSCapabilities`: IO performance requirements for access to the data.

In each of the above, not all combinations of attribute values are likely to be supported by the storage service.

Known supported combinations of attribute values are used to construct entries in the `LinesOfService` array property. Not all attributes of a line of service entry need be specified (i.e. some may be Null). If an attribute has no value, the storage service may choose any supported values when provisioning for that entry. Otherwise, the line of service attribute values specifies the kind or level of service to be provided.

5.4 The ClassOfService resource

A class of service represents a choice of utility or warranty offered to customers by a service. (ITIL uses the term `service option`. See the [Normative References](#).)

Each `ClassOfService` resource is a uniquely named description of the characteristics of one choice of utility or warranty for a service. Each `ClassOfService` is a description of the kind and quality of service to provide and is not intended to describe how the service provides that service.

Each `ClassOfService` is defined by an aggregation of lines of service. Supported lines of service are listed in the corresponding capabilities attributes of the storage service, (see above).

Currently defined lines of service are:

- **Data Protection**: Describes the characteristics of a replica that protects data from loss.
- **Data Security**: Describe data security service level requirements. The data security characteristics enable the storage system to be used in an environment where compliance with an externally-specified security standard or standards is required. Examples of such standards include FIPS-140, HIPAA and PCI.
- **Data Storage**: Describes provisioning and access characteristics for storage of the data.
- **IO Connectivity**: Describes IO connectivity requirements for access to the data.
- **IO Performance**: Describes the IO performance requirements for access to the data under a particular workload.

Some advertised `ClassOfService` resources are created by the service implementation. These are generally not changeable and are intrinsic to the implementation.

A service may support creation or modification of `ClassOfService` resources. All must be consistent with the capabilities of the service.

5.5 The Endpoint resource

Endpoints represent one end of a protocol specific connection that supports sending or receiving messages according to a particular protocol.

5.6 The Endpoint Collection resource

The `Endpoint Group` is resource collection that references a set of `Endpoint` resources.

5.7 The EndpointGroup resource

The `EndpointGroup` is a resource that represents a set of `Endpoint` resources that have the same management characteristics and which will all have the same access state.

5.8 The EndpointGroupCollection resource

The `EndpointGroupCollection` is resource collection that references a set of `EndpointGroup` resources.

5.9 The StorageGroup resource

StorageGroups represent a set of volumes that are managed as a group with the same consistency requirements. The volumes of a storage group are collectively exposed or hidden to a set of clients.

The set of volumes is specified by the `Volumes` attribute, which is a resource collection that references volumes.

The set of client endpoints to which the volumes can be exposed is specified by the `ClientEndpointGroups` attribute. The `ClientEndpointGroup` resource specifies a collection of `EndpointGroup` resources.

The set of server endpoints to which the volumes can be exposed is specified by the `ServerEndpointGroups` attribute. The `ServerEndpointGroup` resource specifies a collection of `EndpointGroup` resources.

5.10 The StoragePool resource

The `StoragePool` resource represents unassigned storage capacity that can be used to produce storage volumes or other storage pools, which conform to one or more classes of service.

The following are the principal properties of `StoragePool` that are used to identify resources provisioned or supported by the storage pool:

- `ClassesOfService`: A reference to a resource collection that specifies the set `ClassOfService` resources that can be specified when provisioning resources from the storage pool.
- `AllocatedVolumes`: A reference to a resource collection that collects `Volume` resources that have been provisioned from the storage pool.
- `AllocatedPools`: A reference to a resource collection that collects `StoragePool` resources that have been provisioned from the storage pool.
- `DefaultClassOfService`: A reference to the default `ClassOfService` resources used for provisioning from the storage pool.

5.11 The Volume resource

`Volume` resource represents a block-addressable container of storage, sometimes referred to as a "Logical Unit", "LU", "LUN", or "StorageVolume" in the storage industry.

Volumes optionally adhere to a `ClassOfService`, which defines added functionality. Examples include:

- Access capabilities
- Capacity and capacity sources
- Consumption tracking (e.g., `LowSpaceWarningThresholdPercents`)
- Replication details
- StorageGroup Information

5.12 The FileSystem resource

This `FileSystem` resource represents a file system. File systems represent file-addressable capacity that are conformant to a `ClassOfService`. Each `FileSystem` may contain a collection of `FileShares` that can be presented to hosts.

6 Data model

6.1 Swordfish extensions to Redfish

6.1.1 Overview

Redfish has added two properties to the `ServiceRoot` that provide access to Swordfish resources.

The first is `StorageSystems`. This property references a collection of `ComputerSystem` resources that each support Swordfish functionality. Each such `ComputerSystem` shall have:

- an entry in its `HostingRoles` property with the value of `StorageServer`

- at least one entry in its `StorageServices.Members` property.

The second is `StorageServices`. This property references a collection of `StorageService` resources. It provides the client an efficient means to search across all `StorageService` resources, regardless of which `ComputerSystem` is supporting the service.

6.1.2 Swordfish and Redfish specific OEM or vendor extensions

The Swordfish and Redfish models are extended by subclassing the OEM `ComplexTypes` that are defined in the Swordfish and Redfish schemas.

6.1.3 OData specific OEM or vendor extensions

In addition to extending the Redfish model as described above. An OEM may extend the Redfish `ServiceContainer` by defining a new `EntityContainer` that extends the `ServiceContainer` found in the Redfish `ServiceRoot_v1.xml` file, (see [OData EntityContainer](#)).

Note: This has the same semantics as subclassing in a typical object oriented environment.

An OEM extended implementation of the Swordfish service would access OEM extensions to `EntityContainer` via the service entry-point `/redfish/v1/odata`.

6.2 Entity Sets

The Swordfish model does not currently expose any explicitly defined entity sets. OData specifies that an entity set is defined for each `NavigationProperty` that is defined as a collection and that has the `ContainsTarget` attribute set to true. In all other cases, Swordfish assumes that an entity set is defined globally within the implementation for each entity type. This is effectively the same as if the entity sets were explicitly defined in the `ServiceRoot` entity container.

6.3 Addressing entities within a collection

An instance (entity) of an `EntityType` is uniquely identified within its entity set by its key. The URI for the reference may specify the key using one of two general strategies

1. OData recommends specifying the key value within parenthesis following the path segment that identifies the referencing entity set. (See clause "Canonical URL" in in [OData](#))
2. Redfish common practice is to use an alternative form that adds a path segment having the value of the key following the path segment that identifies the referencing collection. (See clause "Alternate Key-as-Segment Syntax" in [OData](#).)

A Swordfish implementation shall support both strategies.

6.4 Addressing members of a ResourceCollection

Redfish specifies that subclasses of `ResourceCollection` shall include a `Members` collection property (See clause "Collection resource response" in [DSP0266](#))

Redfish allows a POST request to a `ResourceCollection` to be equivalent to the same POST request to the `Members` property of that `ResourceCollection`.

For a particular `ResourceCollection`, if a Swordfish implementation supports either form, it shall support both.

It is common practice in Redfish to also eliminate the `Members` property from any request URI that navigates through a type hierarchy that includes a `Member` within a `ResourceCollection`. Care should be taken when defining and using a `ResourceCollection` subclass to not introduce ambiguities when an explicit reference to a `Members` property is dropped from a request URI.

6.5 Schema repository

The primary online source for the Swordfish schema shall be co-located on the DMTF schema site with the Redfish schema: <http://redfish.dmtf.org/schemas/swordfish>

Developers may also download the schema as part of the Swordfish bundle from snia.org (refer to snia.org/swordfish for pointers to the bundle locations).

Implementations should refer either to the versions available on the dmtof.org site or to locally provided instances of the schema.

6.6 Referencing other schemas

Swordfish directly reference the following Redfish schemas. - Chassis - ChassisCollection - ComputerSystem - ComputerSystemCollection - Drive - Endpoint - EthernetInterface - EventService - Location - RedfishExtensions - Redundancy - ResourceTask - Schedule - ServiceContainer - ServiceRoot

Other Redfish schema may be added by inference or directly to implementations. Examples are available in the Swordfish mockups.

7 Schema Considerations

7.1 Schema Introduction and Overview

A complete Swordfish implementation includes a Redfish-defined Service Root, is instantiated upon a StorageSystem/ComputerSystem, and runs on a Redfish Chassis. At the same time, a storage client may focus entirely on the storage schema instantiations and never interact with the Redfish portion of an implementation.

Swordfish is defined in terms of schema extended from Redfish which are defined below. This section provides additional definition and context for these schema.

7.2 Common schema attributes

The following table lists common schema attributes used in the definition of Swordfish, for details see [CSDL](#)

Table 5: Schema attributes

Name	Applies to	Description
Abstract	ComplexType, EntityType	If true, the entity may not be instantiated
BaseType	ComplexType, EntityType	Names an inherited element.
DefaultValue	Property	The value of a property if not explicitly set
Name	All	The name of the schema element
Nullable	NavigationProperty, Property	If false, the qualified property shall have a value. The default value is true. A navigation property whose Type attribute specifies a collection shall not specify Nullable=false, as the collection always exists, but may just be empty. <i>Note: Null is not itself a value, but is an indication of no value.</i>
Type	Property	The type of the element

7.3 Default values and NULLABLE attributes

The interaction of `Nullable` and `DefaultValue` needs to be clearly understood by both implementers and client developers. The possible combinations of are summarized in [Table 6](#). The table contains:

- **Nullable:** True, if a given property may be NULL
- **DefaultValue:** True, if a default value is provided for a given property
- **Client:** True, if a client value is supplied for a given property in a query or response
- **Result:** The resultant value of the given property. One of:
 - C: The client-provided value
 - D: The default value
 - Null: Null
 - I: Implementation defined
 - Error: Error state

Table 6: Default and Nullable Interaction

Nullable	DefaultValue	Client	Value
T	T	T	C
T	T	F	D
T	F	T	C
T	F	F	I or Null
F	T	T	C

Nullable	DefaultValue	Client	Value
F	T	F	D
F	F	T	C
F	F	F	I or Error

7.4 Common schema annotations

The following table lists common annotation used in the definition of Swordfish, for details see [OData Capabilities Vocabulary](#), [OData Core Vocabulary](#), [OData Measures Vocabulary](#), and [Redfish Extensions](#).

Table 7: Schema annotations

Name	Applies to	Description
AllowableValues	Parameter	The set of allowable values for a parameter
AutoExpand	NavigationProperty	If true, return expand the target element
AutoExpandReferences	NavigationProperty	If true, return references to the target element
ConformanceLevel	EntityContainer	Specifies OData conformance level
Deprecated	All	Specifies that the element may be removed in future major revisions, but shall continue to be supported as specified in the current revision.
Description	All	A brief description of a model element
LongDescription	All	A normative description of a model element
Maximum	Parameter, Property	Maximum value that an integer property or parameter may have
Minimum	Parameter, Property	Minimum value that an integer property or parameter may have
Pattern	Parameter, Property	Specifies a pattern that the value shall match
Permissions	NavigationProperty, Property	Access permission for the property.
Required	NavigationProperty, Property	If true, property is required to be supported by the service. The default is optional.
RequiredOnCreate	NavigationProperty, Property	If true, property is required on creation
Unit	Property	The unit of measure for the value.

7.5 Schema repository

The primary online source for the Swordfish schema shall be co-located on the DMTF schema site with the Redfish schema: <http://redfish.dmtf.org/schemas/swordfish>. Developers may also download the schema as part of the Swordfish bundle from snia.org (refer to snia.org/swordfish for pointers to the bundle locations).

Implementations should refer either to the versions available on the dmtof.org site or to locally provided instances of the schema.

7.6 Referencing other schemas

Swordfish directly references the following Redfish schemas:

Redfish Schema
Chassis
ChassisCollection
ComputerSystem
ComputerSystemCollection
Drive
Endpoint
EthernetInterface

Redfish Schema
EventService
Location
RedfishExtensions
Redundancy
ResourceTask
Schedule
ServiceContainer
ServiceRoot

Other Redfish schema may be added by inference or directly to implementations. Examples are available in the Swordfish mockups.

8 Implementation requirements

8.1 Security

This document generally adheres to the security requirements defined in the [Redfish Specification](#). It extends the Redfish security model in one important way:

- Swordfish implementations shall implement [TLS version 1.2](#) or greater.

8.2 General constraints

The Swordfish service interface extends the Redfish service interface. As such, a Swordfish service is a Redfish service and all required elements of the Redfish model shall be present in a Swordfish model.

Swordfish functionality shall not conflict with any previously defined Redfish functionality but it may add to or extend it, and it may add additional constraints on Redfish functionality.

Additionally, any functionality desired in a Swordfish implementation that is specified in Redfish shall follow the requirements as specified in the Redfish specification.

8.3 Discovering Swordfish resources

Each Swordfish implementation supports the following well-known URLs, as defined in [Redfish](#). Specifically:

- `/Redfish`, which contains one or more version properties for the integrated Swordfish and Redfish implementation, starting with `v1`.
- `/Redfish/v1`, which addresses a `ServiceRoot` instance, which defines the Redfish default principal starting information for version 1 implementation of an integrated Redfish and Swordfish service. A GET operation to it shall retrieve the value of an instance of a `ServiceRoot` `EntityType` as defined in the [ServiceRoot_v1.xml](#) file.
- `/Redfish/v1/odata`, which addresses a `ServiceContainer` instance, which defines OData conformant principal starting information for the same version 1 implementation of an integrated Redfish and Swordfish service. A GET operation shall retrieve the value of an instance of a `ServiceContainer` `EntityContainer` as defined in the [ServiceRoot_v1.xml](#) file.

Note: Since the `ServiceContainer` is required to return an `@odata.context` value of `/redfish/v1`, all other elements accessed via it will be the same elements found via the `ServiceRoot`.

Note: A Swordfish service is a Redfish service with extensions to support storage management. No additional service entry-points are necessary.

Both the `ServiceRoot` and `ServiceContainer` contain a resource collection named `Systems` that lists `ComputerSystem` instances. A `ComputerSystem` instance that supports Swordfish defined services will have a value of "StorageServer" in an entry of its `HostingRoles` property.

The `ServiceContainer` additionally has a `Service` attribute that references the `ServiceRoot` resource.

Regardless of starting point, the property values of the `ServiceRoot` instance enable navigation to all other resources exposed by the Swordfish service.

8.4 ClassOfService requirements

Each `ClassOfService` shall include at least one line of service. The providing server shall assure that the line of service values of a `ClassOfService` collectively represent a supported choice of service.

8.5 StorageSystems requirements

For Hosted Service Configurations, this property of the `ServiceRoot` references a collection of `ComputerSystem` resources that each support Swordfish functionality. Each `ComputerSystem` included in the `StorageSystems` entry in the `ServiceRoot` shall have:

- an entry in its `HostingRoles` property with the value of `StorageServer`
- at least one entry in its `StorageServices.Members` property.

For Integrated Service Configurations, the `StorageSystems` concept is realized through the `StorageController` resource. Each `StorageController` instantiated as a Swordfish `StorageSystem` shall have:

- at least one entry in its `StorageController.Links` property `StorageServices` collection identifying related `StorageServices`

8.6 Entity Sets

The Swordfish model does not currently expose any explicitly defined entity sets. OData specifies that an entity set is defined for each `NavigationProperty` that is defined as a collection and that has the `ContainsTarget` attribute set to true. In all other cases, Swordfish assumes that an entity set is defined globally within the implementation for each entity type. This is effectively the same as if the entity sets were explicitly defined in the `ServiceRoot` entity container.

8.7 Addressing entities within a collection

An instance (entity) of an `EntityType` is uniquely identified within its entity set by its key. The URI for the reference may specify the key using one of two general strategies

1. OData recommends specifying the key value within parenthesis following the path segment that identifies the referencing entity set. (See clause "Canonical URL" in in [OData](#))
2. Redfish common practice is to use an alternative form that adds a path segment having the value of the key following the path segment that identifies the referencing collection. (See clause "Alternate Key-as-Segment Syntax" in [OData](#).)

A Swordfish implementation shall support both strategies.

8.8 Addressing members of a ResourceCollection

Redfish specifies that subclasses of `ResourceCollection` shall include a `Members` collection property (See clause "Collection resource response" in [DSPo266](#))

Redfish allows a POST request to a `ResourceCollection` to be equivalent to the same POST request to the `Members` property of that `ResourceCollection`. For a particular `ResourceCollection`, if a Swordfish implementation supports either form, it shall support both.

It is common practice in Redfish to also eliminate the `Members` property from any request URI that navigates through a type hierarchy that includes a `Member` within a `ResourceCollection`. Care should be taken when defining and using a `ResourceCollection` subclass to not introduce ambiguities when an explicit reference to a `Members` property is dropped from a request URI.

9 Swordfish type definitions

9.1 Overview

The following sections define the schema and type definitions that make up a Swordfish implementation. Each data type or entity within the schema includes a description that defines its implementation requirements and their interaction

9.2 Common properties

This section describes the properties (data fields) that share a common definition across many or all Redfish schema

9.2.1 Properties defined for all Redfish schemas

The following properties are included in every Redfish schema, and therefore may be encountered in any Response payload. They are documented here to avoid repetition in the Resource Guide tables for each schema.

@odata.context	string	read-only	The @odata.context property is a URL to a metadata document with a fragment describing the data (typically rooted at the top-level singleton or collection). Technically the metadata document only has to define, or reference, any of the types that it directly uses, and different payloads could reference different metadata documents. However, since the @odata.context provides a root URL for resolving relative references (such as @odata.id's), we return the canonical metadata document.
@odata.id	string	read-only	The @odata.id property is a string that indicates the unique identifier of a resource.
@odata.type	string	read-only	The @odata.type property is a URL fragment that indicates the type of the resource.
Description	string	read-write	The Description property is used to convey a human-readable description of the resource.
Id	string	read-write	The Id property of a resource uniquely identifies the resource within the Resource Collection that contains it. The value of Id is unique within a Resource Collection.
Name	string	read-write	The Name property is used to convey a human-readable moniker for a resource. The type of the Name property is a string. The value of Name is NOT necessarily unique across resource instances within a Resource Collection.
Oem { }	object	read-write	This is the manufacturer/provider specific extension moniker used to divide the Oem object into sections. See the Resource schema for details on this property.

9.2.2 Links

The Links property represents the links associated with the resource, as defined by that resource's schema definition. All associated reference properties defined for a resource are nested under the Links property. All directly referenced (subordinate) properties defined for a resource can be found from the root of the resource.

9.2.3 Actions

The Actions property contains the actions supported by a resource.

9.2.4 OEM

The OEM property is used for OEM extensions.

9.2.5 RelatedItem

The RelatedItem property is represented as a set of links. The links point to a resource, or part of a resource, as defined by that resource's schema definition.

This representation is not intended to be a strong linking methodology like other references. Instead it is used to show a relationship between elements or sub-elements in disparate parts of the service. For example, Fans may be in one area of the system and Processors in another area of the system. It could be that the relationship between the two is not obvious. The RelatedItem property can be used to show that one is related to the other. In this example, it might indicate that a specific fan is cooling a specific processor.

9.2.6 Status

The Status property is common to many Redfish schema.

Health	string (enum)	read-only	This represents the health state of this resource in the absence of its dependent resources. See Health in Property Details, below, for the possible values of this property.
HealthRollup	string (enum)	read-only	This represents the overall health state from the view of this resource. See HealthRollup in Property Details, below, for the possible values of this property.

Oem { }	object	read-write	Oem extension object.
State	string (enum)	read-only	This indicates the known state of the resource, such as if it is enabled. See State in Property Details, below, for the possible values of this property.

9.2.6.1 Property details

Health:

This represents the health state of this resource in the absence of its dependent resources.

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

HealthRollup:

This represents the overall health state from the view of this resource.

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

State:

This indicates the known state of the resource, such as if it is enabled.

string	Description
Absent	This function or resource is not present or not detected.
Disabled	This function or resource has been disabled.
Enabled	This function or resource has been enabled.
InTest	This function or resource is undergoing testing.
Quiesced	The element is enabled but only processes a restricted set of commands.
StandbyOffline	This function or resource is enabled, but awaiting an external action to activate it.
StandbySpare	This function or resource is part of a redundancy set and is awaiting a failover or other external action to activate it.
Starting	This function or resource is starting.
UnavailableOffline	This function or resource is present but cannot be used.
Updating	The element is updating and may be unavailable or degraded.

9.2.7 Location

AltitudeMeters	number (m)	read-only (null)	The altitude of the resource in meters.
Info	string	read-only (null)	This indicates the location of the resource.
InfoFormat	string	read-only (null)	This represents the format of the Info property.
Latitude	number (deg)	read-only (null)	The latitude resource.

Longitude	number (deg)	read-only (null)	The longitude resource in degrees.
Oem { }	object	read-write	Oem extension object. See the Resource schema for details on this property.
PartLocation { }	object	read-write	Postal address of the addressed resource.
LocationOrdinalValue	number	read-only (null)	The number that represents the location of the part. If LocationType is slot and this unit is in slot 2 then the LocationOrdinalValue will be 2.
LocationType	string (enum)	read-only	The type of location of the part, such as slot, bay, socket and slot. See LocationType in Property Details, below, for the possible values of this property.
Orientation	string (enum)	read-only	The orientation for the ordering of the slot enumeration used by the LocationOrdinalValue property. See Orientation in Property Details, below, for the possible values of this property.
Reference	string (enum)	read-only	The reference point for the part location. This is used to give guidance as to the general location of the part. See Reference in Property Details, below, for the possible values of this property.
ServiceLabel }	string	read-only (null)	This is the label of the part location, such as a silk screened name or a printed label.
Placement { }	object	read-write	A place within the addressed location.
Rack	string	read-write (null)	Name of a rack location within a row.
RackOffset	number	read-write (null)	Vertical location of the item in terms of RackOffsetUnits.
RackOffsetUnits	string (enum)	read-write	The type of Rack Units in use. See RackOffsetUnits in Property Details, below, for the possible values of this property.
Row }	string	read-write (null)	Name of row.
PostalAddress { }	object	read-write	Postal address of the addressed resource.
AdditionalCode	string	read-write (null)	Additional code.
Building	string	read-write (null)	Name of the building.
City	string	read-write (null)	City, township, or shi (JP).
Community	string	read-write (null)	Postal community name.
Country	string	read-write (null)	Country.
District	string	read-write (null)	A county, parish, gun (JP), or district (IN).
Division	string	read-write (null)	City division, borough, dity district, ward, chou (JP).

Floor	string	read-write (null)	Floor.
GPSCoords	string	read-write (null)	The GPS coordinates of the part.
HouseNumber	number	read-write (null)	Numeric portion of house number.
HouseNumberSuffix	string	read-write (null)	House number suffix.
Landmark	string	read-write (null)	Landmark.
LeadingStreetDirection	string	read-write (null)	A leading street direction.
Location	string	read-write (null)	Room designation or other additional info.
Name	string	read-write (null)	Name.
Neighborhood	string	read-write (null)	Neighborhood or block.
POBox	string	read-write (null)	Post office box (P.O. box).
PlaceType	string	read-write (null)	A description of the type of place that is addressed.
PostalCode	string	read-write (null)	Postal code (or zip code).
Road	string	read-write (null)	A primary road or street.
RoadBranch	string	read-write (null)	Road branch.
RoadPostModifier	string	read-write (null)	Road post-modifier.
RoadPreModifier	string	read-write (null)	Road pre-modifier.
RoadSection	string	read-write (null)	Road Section.
RoadSubBranch	string	read-write (null)	Road sub branch.
Room	string	read-write (null)	Name or number of the room.

Seat	string	read-write (null)	Seat (desk, cubicle, workstation).
Street	string	read-write (null)	Street name.
StreetSuffix	string	read-write (null)	Avenue, Platz, Street, Circle.
Territory	string	read-write (null)	A top-level subdivision within a country.
TrailingStreetSuffix	string	read-write (null)	A trailing street suffix.
Unit }	string	read-write (null)	Name or number of the unit (apartment, suite).

9.2.7.1 Property details

LocationType:

The type of location of the part, such as slot, bay, socket and slot.

string	Description
Bay	Defines a bay as the type of location.
Connector	Defines a connector as the type of location.
Slot	Defines a slot as the type of location.
Socket	Defines a socket as the type of location.

Orientation:

The orientation for the ordering of the slot enumeration used by the LocationOrdinalValue property.

string	Description
BackToFront	Defines the ordering for the LocationOrdinalValue is back to front.
BottomToTop	Defines the ordering for the LocationOrdinalValue is bottom to top.
FrontToBack	Defines the ordering for the LocationOrdinalValue is front to back.
LeftToRight	Defines the ordering for the LocationOrdinalValue is left to right.
RightToLeft	Defines the ordering for the LocationOrdinalValue is right to left.
TopToBottom	Defines the ordering for the LocationOrdinalValue is top to bottom.

RackOffsetUnits:

The type of Rack Units in use.

string	Description
EIA_310	Defines a rack unit as being equal to 1.75 in (44.45 mm).
OpenU	Defines a rack unit as being equal to 48 mm (1.89 in).

Reference:

The reference point for the part location. This is used to give guidance as to the general location of the part.

string	Description
Bottom	Defines the part as being in the bottom of the unit.
Front	Defines the part as being in the front of the unit.
Left	Defines the part as being in the left of the unit.

string	Description
Middle	Defines the part as being in the middle of the unit.
Rear	Defines the part as being in the rear of the unit.
Right	Defines the part as being in the right of the unit.
Top	Defines the part as being in the top of the unit.

9.3 Complex Types

The following table defines a number of complex types that are used frequently in Swordfish schema. Multiple references to each complex type may be seen in later sections. For detailed definitions and properties contained in each complex type, refer to the schema definitions as referenced in the table.

Capacity {}	This composition may be used to represent storage capacity. The sum of the values in Data, Metadata, and Snapshot shall be equal to the total capacity for the datastore. See the Capacity.v1_1_0 schema for details.
CapacityInfo {}	This composition may be used to represent the utilization of storage capacity. See the Capacity.v1_1_0 schema for details.
IOStatistics {}	See the IOStatistics.v1_0_1 schema for details on this property.
IOWorkload {}	This structure may be used to describe an IO Workload. See the IOPerformanceLoSCapabilities.v1_0_0 schema for details.
IOWorkloadComponent {}	This structure may be used to describe a component of an IO workload. See the IOPerformanceLoSCapabilities.v1_1_1 schema for details.
ReplicaInfo {}	The value shall define the characteristics of a replica. See the StorageReplicaInfo.v1_1_0 schema for details.
ReplicaRequest {}	See the DataProtectionLineOfService.v1_1_0 schema for details.
Schedule {}	Schedule a series of occurrences. See the Schedule.v1_1_0 schema for details.

9.4 CapacitySources 1.1.0

This composition may be used to represent storage capacity. The sum of the values in Data, Metadata, and Snapshot shall be equal to the total capacity for the data store.

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
ProvidedCapacity {}	object <i>read-write</i> (null)	The value shall be the amount of space that has been provided from the ProvidingDrives, ProvidingVolumes, ProvidingMemory or ProvidingPools.
@odata.id	string <i>read-only</i>	Link to another Capacity resource.
}		

ProvidedClassOfService {	object <i>read-write</i> <i>(null)</i>	The value shall reference the provided ClassOfService from the ProvidingDrives, ProvidingVolumes, ProvidingMemoryChunks, ProvidingMemory or ProvidingPools. See the <i>ClassOfService</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
ProvidingDrives {	object <i>read-write</i> <i>(null)</i>	If present, the value shall be a reference to a contributing drive or drives. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>Drive</i> . See the Drive schema for details.
}		
ProvidingMemory {	object <i>read-write</i> <i>(null)</i>	If present, the value shall be a reference to the contributing memory.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}		
ProvidingMemoryChunks {	object <i>read-write</i> <i>(null)</i>	If present, the value shall be a reference to the contributing memory chunks.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}		
ProvidingPools {	object <i>read-write</i> <i>(null)</i>	If present, the value shall be a reference to a contributing storage pool or storage pools. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>StoragePool</i> . See the StoragePool schema for details.
}		
ProvidingVolumes {	object <i>read-write</i> <i>(null)</i>	If present, the value shall be a reference to a contributing volume or volumes. Contains a link to a resource.

@odata.id	string <i>read-only</i>	Link to Collection of <i>Volume</i> . See the Volume schema for details.
}		

9.5 ClassOfService 1.1.1

This resource shall define a service option composed of one or more line of service entities. ITIL defines a service option as a choice of utility or warranty for a service.

Actions (v1.1+) {}	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
ClassOfServiceVersion	string <i>read-write</i> <i>(null)</i>	The version describing the creation or last modification of this service option specification. The string representing the version shall be in the form: M + '.' + N + '.' + U Where: M - The major version (in numeric form). N - The minor version (in numeric form). U - The update (e.g. errata or patch in numeric form).
DataProtectionLinesOfService (v1.1.1+) [{	array <i>read-write</i>	The value shall be a set of data protection service options. Within a class of service, one data protection service option shall be present for each replication session.
@odata.id	string <i>read-only</i>	Link to a DataProtectionLineOfService resource. See the Links section and the <i>DataProtectionLineOfService</i> schema for details.
}]		
DataSecurityLinesOfService (v1.1.1+) [{	array <i>read-write</i>	The value shall be a set of data security service options.
@odata.id	string <i>read-only</i>	Link to a DataSecurityLineOfService resource. See the Links section and the <i>DataSecurityLineOfService</i> schema for details.
}]		
DataStorageLinesOfService (v1.1.1+) [{	array <i>read-write</i>	The value shall be a set of data protection service options.
@odata.id	string <i>read-only</i>	Link to a DataStorageLineOfService resource. See the Links section and the <i>DataStorageLineOfService</i> schema for details.
}]		
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
IOConnectivityLinesOfService (v1.1.1+) [{	array <i>read-write</i>	The value shall be a set of IO connectivity service options. Within a class of service, at most one IO connectivity service option may be present for a value of AccessProtocol.

@odata.id	string <i>read-only</i>	Link to a <i>IOConnectivityLineOfService</i> resource. See the Links section and the <i>IOConnectivityLineOfService</i> schema for details.
}]		
IOPerformanceLinesOfService (v1.1.1+)[{	array <i>read-write</i>	The value shall be a set of IO performance service options.
@odata.id	string <i>read-only</i>	Link to a <i>IOPerformanceLineOfService</i> resource. See the Links section and the <i>IOPerformanceLineOfService</i> schema for details.
}]		
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	<i>read-write</i> (null)	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.6 ClassOfServiceCollection

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	The value of each member entry shall reference a <i>ClassOfService</i> resource.
@odata.id	string <i>read-only</i>	Link to a <i>ClassOfService</i> resource. See the Links section and the <i>ClassOfService</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.7 DataProtectionLineOfService 1.1.0

This service option describes a replica that protects data from loss. The requirements must be met collectively by the communication path and the replica.

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
IsIsolated	boolean <i>read-write</i> (null)	True shall indicate that the replica is in a separate fault domain from its source. The default value of this property is false.
MinLifetime	string <i>read-write</i> (null)	The value shall be an ISO 8601 duration that specifies the minimum required lifetime of the replica. Note: The maximum number of replicas can be determined using this value together with the replicaSchedule.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
RecoveryGeographicObjective	string (enum) <i>read-write</i> (null)	The value specifies the geographic scope of the failure domain. See <i>RecoveryGeographicObjective</i> in <i>Property Details</i> , below, for the possible values of this property.
RecoveryPointObjectiveTime	string <i>read-write</i> (null)	The value shall be an ISO 8601 duration that specifies the maximum time over which source data may be lost on failure. In the case that <i>IsIsolated</i> = false, failure of the domain is not a consideration.
RecoveryTimeObjective	string (enum) <i>read-write</i> (null)	The value shall be an enumeration that indicates the maximum time required to access an alternate replica. In the case that <i>IsIsolated</i> = false, failure of the domain is not a consideration. See <i>RecoveryTimeObjective</i> in <i>Property Details</i> , below, for the possible values of this property.
ReplicaAccessLocation {}	object <i>read-write</i> (null)	This value shall be used if the data access location of the replica is required to be at a specific location. Note 1: The location value may be granular. Note 2: A value may be required for some regulatory compliance. See the <i>Location.v1_o_o</i> schema for details on this property.
ReplicaClassOfService {	object <i>read-write</i> (null)	The value shall reference the class of service that defines the required service levels of the replica. See the <i>ClassOfService</i> schema for details on this property.

@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
ReplicaType	string (enum) <i>read-write (null)</i>	The type of replica shall conform to this value. See <i>ReplicaType</i> in <i>Property Details</i> , below, for the possible values of this property.
Schedule	<i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/swordfish/v1/Schedule.json#/definitions/Schedule schema for details.

9.7.1 Property Details

9.7.1.1 RecoveryGeographicObjective:

The value specifies the geographic scope of the failure domain.

string	Description
Datacenter	A facility that provides communication, power, or cooling infrastructure to a co-located set of servers, networking and storage.
Rack	A container within a datacenter that provides communication, power, or cooling to a set of components.
RackGroup	A set of racks that may share common communication, power, or cooling.
Region	A set of resources that are required to be either geographically or politically isolated from resources not in the resources.
Row	A set of adjacent racks or rackgroups that may share common communication, power, or cooling.
Server	Components of a CPU/memory complex that share the same infrastructure.

9.7.1.2 RecoveryTimeObjective:

The value shall be an enumeration that indicates the maximum time required to access an alternate replica. In the case that *IsIsolated* = false, failure of the domain is not a consideration.

string	Description
Nearline	Access to a replica shall be consistent with switching access to a different path through a different front-end interconnection infrastructure. Some inconsistency may occur. A restore step may be required before recovery can commence.
Offline	Access to a replica may take a significant amount of time. No direct connection to the replica is assumed. Some inconsistency loss may occur. A restore step is likely to be required.
OnlineActive	Access to synchronous replicas shall be instantaneous.
OnlinePassive	Access to a synchronous replica shall be consistent with switching access to a different path the same front-end interconnect. A restore step shall not be required.

9.7.1.3 ReplicaType:

The type of replica shall conform to this value.

string	Description
Clone	This enumeration literal shall indicate that replication shall create a point in time, full copy the source.
Mirror	This enumeration literal shall indicate that replication shall create and maintain a copy of the source.
Snapshot	This enumeration literal shall indicate that replication shall create a point in time, virtual copy of the source.
TokenizedClone	This enumeration literal shall indicate that replication shall create a token based clone.

9.8 DataProtectionLoSCapabilities 1.1.1

The capabilities to protect data from loss by the use of a replica. The requirements shall be met collectively by the communication path and the replica. There should be one instance associated to a class of service for each replica. Each replica independently should have a class of service that describes its characteristics.

Actions (<i>v1.1+</i>) {}	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read-write</i> <i>(null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Links {	object <i>read-only</i>	The value of this property shall contains links to other resources that are not contained in this resource.
Oem {}	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
SupportedReplicaOptions [{	array <i>read-write</i>	The collection shall contain known and supported replica Classes of Service.
@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}]		
SupportedReplicaOptions@odata.count	number <i>read-only</i>	The value of this property shall be an integer representing the number of items in a collection.
}		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
SupportedLinesOfService [{	array <i>read-write</i>	The collection shall contain known and supported DataProtectionLinesOfService.

@odata.id	string <i>read-only</i>	Link to a DataProtectionLineOfService resource. See the Links section and the <i>DataProtectionLineOfService</i> schema for details.
}]		
SupportedMinLifetimes []	array (string, null) <i>read-write</i>	The value of each entry shall be an ISO 8601 duration that specifies the minimum lifetime required for the replica.
SupportedRecoveryGeographicObjectives [{	array <i>read-write</i>	The value of each entry shall specify a supported failure domain.
FailureDomainScope	string (enum) <i>read-write</i> (null)	The enumeration literals of this enumeration shall represent a geographic scope in which all components within that scope have similar vulnerabilities. <i>See FailureDomainScope in Property Details, below, for the possible values of this property.</i>
}]		
SupportedRecoveryPointObjectiveTimes []	array (string, null) <i>read-write</i>	The value of each entry shall specify a supported ISO 8601 time interval defining the maximum source information that may be lost on failure. In the case that <i>IsIsolated</i> = false, failure of the domain is not a consideration.
SupportedRecoveryTimeObjectives [{	array <i>read-write</i>	The value of each entry shall specify an enumerated value that indicates a supported expectation for the time required to access an alternate replica. In the case that <i>IsIsolated</i> = false, failure of the domain is not a consideration.
RecoveryAccessScope	string (enum) <i>read-write</i> (null)	The enumeration literals shall represent the relative time required to make a replica available as a source. <i>See RecoveryAccessScope in Property Details, below, for the possible values of this property.</i>
}]		
SupportedReplicaTypes [{	array <i>read-write</i>	The value of each entry shall specify a supported replica type
ReplicaType	string (enum) <i>read-write</i> (null)	The enumeration literals may be used to specify the intended outcome of the replication. <i>See ReplicaType in Property Details, below, for the possible values of this property.</i>
}]		
SupportsIsolated	boolean <i>read-write</i> (null)	A value of true shall indicate that allocating a replica in a separate fault domain is supported. The default value for this property is false.

9.8.1 Property Details

9.8.1.1 FailureDomainScope:

The enumeration literals of this enumeration shall represent a geographic scope in which all components within that scope have similar vulnerabilities.

string	Description
Datacenter	A facility that provides communication, power, or cooling infrastructure to a co-located set of servers, networking and storage.
Rack	A container within a datacenter that provides communication, power, or cooling to a set of components.
RackGroup	A set of racks that may share common communication, power, or cooling.
Region	A set of resources that are required to be either geographically or politically isolated from resources not in the resources.
Row	A set of adjacent racks or rackgroups that may share common communication, power, or cooling.
Server	Components of a CPU/memory complex that share the same infrastructure.

9.8.1.2 RecoveryAccessScope:

The enumeration literals shall represent the relative time required to make a replica available as a source.

string	Description
Nearline	Access to a replica shall be consistent with switching access to a different path through a different front-end interconnection infrastructure. Some inconsistency may occur. A restore step may be required before recovery can commence.
Offline	Access to a replica may take a significant amount of time. No direct connection to the replica is assumed. Some inconsistency loss may occur. A restore step is likely to be required.
OnlineActive	Access to synchronous replicas shall be instantaneous.
OnlinePassive	Access to a synchronous replica shall be consistent with switching access to a different path the same front-end interconnect. A restore step shall not be required.

9.8.1.3 ReplicaType:

The enumeration literals may be used to specify the intended outcome of the replication.

string	Description
Clone	This enumeration literal shall indicate that replication shall create a point in time, full copy the source.
Mirror	This enumeration literal shall indicate that replication shall create and maintain a copy of the source.
Snapshot	This enumeration literal shall indicate that replication shall create a point in time, virtual copy of the source.
TokenizedClone	This enumeration literal shall indicate that replication shall create a token based clone.

9.9 DataSecurityLineOfService 1.0.0

This structure shall be used to describe data security service level requirements.

AntivirusEngineProvider	string <i>read-write</i> (null)	The value shall specify an AntiVirus provider.
AntivirusScanPolicies [{	array <i>read-write</i>	The enumeration literal shall specify the policy for triggering an AntiVirus scan.
AntiVirusScanTrigger	string (enum) <i>read-write</i> (null)	The enumeration literals shall specify types of antivirus scan triggers. <i>See AntiVirusScanTrigger in Property Details, below, for the possible values of this property.</i>
}]		

ChannelEncryptionStrength	string (enum) <i>read- write (null)</i>	The enumeration literal shall specify a key size in a symmetric encryption algorithm for transport channel encryption. <i>See ChannelEncryptionStrength in Property Details, below, for the possible values of this property.</i>
DataSanitizationPolicy	string (enum) <i>read- write (null)</i>	The enumeration literal shall specify the data sanitization policy. <i>See DataSanitizationPolicy in Property Details, below, for the possible values of this property.</i>
Description	string <i>read- only (null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
HostAuthenticationType	string (enum) <i>read- write (null)</i>	The enumeration literal shall specify the authentication type for hosts (servers) or initiator endpoints. <i>See HostAuthenticationType in Property Details, below, for the possible values of this property.</i>
Id	string <i>read- only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
MediaEncryptionStrength	string (enum) <i>read- write (null)</i>	The enumeration literal shall specify a key size in a symmetric encryption algorithm for media encryption. <i>See MediaEncryptionStrength in Property Details, below, for the possible values of this property.</i>
Name	string <i>read- only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read- write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
SecureChannelProtocol	string (enum) <i>read- write (null)</i>	The enumeration literal shall specify the protocol that provide encrypted communication. <i>See SecureChannelProtocol in Property Details, below, for the possible values of this property.</i>
UserAuthenticationType	string (enum) <i>read- write (null)</i>	The enumeration literal shall specify the authentication type for users (or programs). <i>See UserAuthenticationType in Property Details, below, for the possible values of this property.</i>

9.9.1 Property Details

9.9.1.1 AntiVirusScanTrigger:

The enumeration literals shall specify types of antivirus scan triggers.

string	Description
None	This enumeration literal specifies No trigger.
OnFirstRead	This enumeration literal specifies to trigger on first read.
OnPatternUpdate	This enumeration literal specifies to trigger on antivirus pattern file update.
OnRename	This enumeration literal specifies to trigger on object rename.
OnUpdate	This enumeration literal specifies to trigger on object update.

9.9.1.2 ChannelEncryptionStrength:

The enumeration literal shall specify a key size in a symmetric encryption algorithm for transport channel encryption.

string	Description
Bits_0	This enumeration literal specifies that there is no key.
Bits_112	This enumeration literal specifies a 3DES 112 bit key.
Bits_128	This enumeration literal specifies an AES 128 bit key.
Bits_192	This enumeration literal specifies an AES 192 bit key.
Bits_256	This enumeration literal specifies an AES 256 bit key.

9.9.1.3 DataSanitizationPolicy:

The enumeration literal shall specify the data sanitization policy.

string	Description
Clear	This enumeration literal specifies to sanitize data in all user-addressable storage locations for protection against simple non-invasive data recovery techniques.
CryptographicErase	This enumeration literal specifies to leverages the encryption of target data by enabling sanitization of the target data's encryption key. This leaves only the ciphertext remaining on the media, effectively sanitizing the data by preventing read-access. For more information, see NIST800-88 and ISO/IEC 27040.
None	This enumeration literal specifies no sanitization.

9.9.1.4 HostAuthenticationType:

The enumeration literal shall specify the authentication type for hosts (servers) or initiator endpoints.

string	Description
None	This enumeration literal specifies No authentication.
PKI	This enumeration literal specifies a Public Key Infrastructure. Customers with the highest assurance requirements roll PKI out to hosts and users (it is more common for hosts than users. User PKI-based authentication has significant operational complications and administrative overheads, e.g., smart cards may be involved.
Password	This enumeration literal specifies Password/shared-secret: Absent an distributed authentication infrastructure, this is what is typically done.
Ticket	This enumeration literal specifies Ticket-based (e.g., Kerberos): This is the most common class of authentication infrastructure used in enterprises. Kerberos is the best known example, and Windows usage of that via Active Directory is so widely deployed as to be a de facto standard. In other areas (e.g., academia) there are comparable ticket-based systems.

9.9.1.5 MediaEncryptionStrength:

The enumeration literal shall specify a key size in a symmetric encryption algorithm for media encryption.

string	Description
Bits_0	This enumeration literal specifies that there is no key.
Bits_112	This enumeration literal specifies a 3DES 112 bit key.
Bits_128	This enumeration literal specifies an AES 128 bit key.
Bits_192	This enumeration literal specifies an AES 192 bit key.
Bits_256	This enumeration literal specifies an AES 256 bit key.

9.9.1.6 SecureChannelProtocol:

The enumeration literal shall specify the protocol that provide encrypted communication.

string	Description
IPsec	This enumeration literal specifies Internet Protocol Security (IPsec), as defined by IETF RFC 2401.
None	This enumeration literal specifies no encryption.
RPCSEC_GSS	This enumeration literal specifies RPC access to the Generic Security Services Application Programming Interface (GSS-API), as defined by IETF RPC 2203.
TLS	This enumeration literal specifies Transport Layer Security (TLS), as defined by IETF RFC 5246.

9.9.1.7 UserAuthenticationType:

The enumeration literal shall specify the authentication type for users (or programs).

string	Description
None	This enumeration literal specifies No authentication.
PKI	This enumeration literal specifies a Public Key Infrastructure. Customers with the highest assurance requirements roll PKI out to hosts and users (it is more common for hosts than users. User PKI-based authentication has significant operational complications and administrative overheads, e.g., smart cards may be involved.
Password	This enumeration literal specifies Password/shared-secret: Absent an distributed authentication infrastructure, this is what is typically done.
Ticket	This enumeration literal specifies Ticket-based (e.g., Kerberos): This is the most common class of authentication infrastructure used in enterprises. Kerberos is the best known example, and Windows usage of that via Active Directory is so widely deployed as to be a de facto standard. In other areas (e.g., academia) there are comparable ticket-based systems.

9.10 DataSecurityLoSCapabilities 1.1.1

This resource may be used to describe data security capabilities.

Actions (<i>v1.1+</i>) {}	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read-write</i> <i>(null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

SupportedAntivirusEngineProviders []	array (string, null) <i>read- write</i>	The entry values shall specify supported AntiVirus providers.
SupportedAntivirusScanPolicies [{	array <i>read- write</i>	The enumeration literal shall specify supported policies that trigger an AntiVirus scan.
AntiVirusScanTrigger	string (enum) <i>read- write (null)</i>	The enumeration literals shall specify types of antivirus scan triggers. <i>See AntiVirusScanTrigger in Property Details, below, for the possible values of this property.</i>
}]		
SupportedChannelEncryptionStrengths [{	array <i>read- write</i>	The enumeration literal shall specify supported key sizes in a symmetric encryption algorithm (AES) for transport channel encryption.
KeySize	string (enum) <i>read- write (null)</i>	The enumeration literals shall specify Key sizes in a symmetric encryption algorithm, (see NIST SP 800-57 part 1 (http://csrc.nist.gov/publications/nistpubs/800-57/sp800-57_part1_rev3_general.pdf) <i>See KeySize in Property Details, below, for the possible values of this property.</i>
}]		
SupportedDataSanitizationPolicies [{	array <i>read- write</i>	The enumeration literal shall specify supported data sanitization policies.
DataSanitizationPolicy	string (enum) <i>read- write (null)</i>	The enumeration literals shall specify types of data sanitization policies. <i>See DataSanitizationPolicy in Property Details, below, for the possible values of this property.</i>
}]		
SupportedHostAuthenticationTypes [{	array <i>read- write</i>	The enumeration literal shall specify supported authentication types for hosts (servers) or initiator endpoints.
AuthenticationType	string (enum) <i>read- write (null)</i>	The enumeration literals shall specify authentication algorithms. <i>See AuthenticationType in Property Details, below, for the possible values of this property.</i>
}]		
SupportedLinesOfService [{	array <i>read- write</i>	The collection shall contain supported DataSecurity service options.
@odata.id	string <i>read- only</i>	Link to a DataSecurityLineOfService resource. See the Links section and the <i>DataSecurityLineOfService</i> schema for details.
}]		

SupportedMediaEncryptionStrengths [{	array <i>read-write</i>	The enumeration literal shall specify supported key sizes in a symmetric encryption algorithm (AES) for media encryption.
KeySize	string (enum) <i>read-write (null)</i>	The enumeration literals shall specify Key sizes in a symmetric encryption algorithm, (see NIST SP 800-57 part 1 (http://csrc.nist.gov/publications/nistpubs/800-57/sp800-57_part1_rev3_general.pdf). See <i>KeySize</i> in <i>Property Details, below, for the possible values of this property.</i>
}]		
SupportedSecureChannelProtocols [{	array <i>read-write</i>	The enumeration literal shall specify supported protocols that provide encrypted communication.
SecureChannelProtocol	string (enum) <i>read-write (null)</i>	The enumeration literals shall specify types of Secure channel protocols. See <i>SecureChannelProtocol</i> in <i>Property Details, below, for the possible values of this property.</i>
}]		
SupportedUserAuthenticationTypes [{	array <i>read-write</i>	The enumeration literal shall specify supported authentication types for users (or programs).
AuthenticationType	string (enum) <i>read-write (null)</i>	The enumeration literals shall specify authentication algorithms. See <i>AuthenticationType</i> in <i>Property Details, below, for the possible values of this property.</i>
}]		

9.10.1 Property Details

9.10.1.1 AntiVirusScanTrigger:

The enumeration literals shall specify types of antivirus scan triggers.

string	Description
None	This enumeration literal specifies No trigger.
OnFirstRead	This enumeration literal specifies to trigger on first read.
OnPatternUpdate	This enumeration literal specifies to trigger on antivirus pattern file update.
OnRename	This enumeration literal specifies to trigger on object rename.
OnUpdate	This enumeration literal specifies to trigger on object update.

9.10.1.2 AuthenticationType:

The enumeration literals shall specify authentication algorithms.

string	Description
None	This enumeration literal specifies No authentication.
PKI	This enumeration literal specifies a Public Key Infrastructure. Customers with the highest assurance requirements roll PKI out to hosts and users (it is more common for hosts than users. User PKI-based authentication has significant operational complications and administrative overheads, e.g., smart cards may be involved.
Password	This enumeration literal specifies Password/shared-secret: Absent an distributed authentication infrastructure, this is what is typically done.

string	Description
Ticket	This enumeration literal specifies Ticket-based (e.g., Kerberos): This is the most common class of authentication infrastructure used in enterprises. Kerberos is the best known example, and Windows usage of that via Active Directory is so widely deployed as to be a de facto standard. In other areas (e.g., academia) there are comparable ticket-based systems.

9.10.1.3 DataSanitizationPolicy:

The enumeration literals shall specify types of data sanitization policies.

string	Description
Clear	This enumeration literal specifies to sanitize data in all user-addressable storage locations for protection against simple non-invasive data recovery techniques.
CryptographicErase	This enumeration literal specifies to leverages the encryption of target data by enabling sanitization of the target data's encryption key. This leaves only the ciphertext remaining on the media, effectively sanitizing the data by preventing read-access. For more information, see NIST800-88 and ISO/IEC 27040.
None	This enumeration literal specifies no sanitization.

9.10.1.4 KeySize:

The enumeration literals shall specify Key sizes in a symmetric encryption algorithm, (see NIST SP 800-57 part 1 (http://csrc.nist.gov/publications/nistpubs/800-57/sp800-57_part1_rev3_general.pdf))

string	Description
Bits_0	This enumeration literal specifies that there is no key.
Bits_112	This enumeration literal specifies a 3DES 112 bit key.
Bits_128	This enumeration literal specifies an AES 128 bit key.
Bits_192	This enumeration literal specifies an AES 192 bit key.
Bits_256	This enumeration literal specifies an AES 256 bit key.

9.10.1.5 SecureChannelProtocol:

The enumeration literals shall specify types of Secure channel protocols.

string	Description
IPsec	This enumeration literal specifies Internet Protocol Security (IPsec), as defined by IETF RFC 2401.
None	This enumeration literal specifies no encryption.
RPCSEC_GSS	This enumeration literal specifies RPC access to the Generic Security Services Application Programming Interface (GSS-API), as defined by IETF RPC 2203.
TLS	This enumeration literal specifies Transport Layer Security (TLS), as defined by IETF RFC 5246.

9.11 DataStorageLineOfService 1.1.0

This structure may be used to describe a service option covering storage provisioning and availability.

AccessCapabilities (v1.1+) [{	array <i>read-write</i>	Each entry specifies a required storage access capability.
StorageAccessCapability	string (enum) <i>read-write</i> <i>(null)</i>	StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage. <i>See StorageAccessCapability in Property Details, below, for the possible values of this property.</i>
}]		

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
IsSpaceEfficient	boolean <i>read-write</i> (null)	A value of true shall indicate that the storage is compressed or deduplicated. The default value for this property is false.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
ProvisioningPolicy	string (enum) <i>read-write</i> (null)	The enumeration literal shall define the provisioning policy for storage. See <i>ProvisioningPolicy</i> in <i>Property Details</i> , below, for the possible values of this property.
RecoveryTimeObjectives	string (enum) <i>read-write</i> (null)	The enumeration literal specifies the time after a disaster that the client shall regain conformant service level access to the primary store, typical values are 'immediate' or 'offline'. The expectation is that the services required to implement this capability are part of the advertising system. See <i>RecoveryTimeObjectives</i> in <i>Property Details</i> , below, for the possible values of this property.

9.11.1 Property Details

9.11.1.1 ProvisioningPolicy:

The enumeration literal shall define the provisioning policy for storage.

string	Description
Fixed	This enumeration literal specifies storage shall be fully allocated.
Thin	This enumeration literal specifies storage may be over allocated.

9.11.1.2 RecoveryTimeObjectives:

The enumeration literal specifies the time after a disaster that the client shall regain conformant service level access to the primary store, typical values are 'immediate' or 'offline'. The expectation is that the services required to implement this capability are part of the advertising system.

string	Description
Nearline	Access to a replica shall be consistent with switching access to a different path through a different front-end interconnection infrastructure. Some inconsistency may occur. A restore step may be required before recovery can commence.
Offline	Access to a replica may take a significant amount of time. No direct connection to the replica is assumed. Some inconsistency loss may occur. A restore step is likely to be required.
OnlineActive	Access to synchronous replicas shall be instantaneous.
OnlinePassive	Access to a synchronous replica shall be consistent with switching access to a different path the same front-end interconnect. A restore step shall not be required.

9.11.1.3 StorageAccessCapability:

StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage.

string	Description
Append	This enumeration literal shall indicate that the storage may be written only to append.
Execute	This value shall indicate that Execute access is allowed by the file share.
Read	This enumeration literal shall indicate that the storage may be read.
Streaming	This enumeration literal shall indicate that the storage may be read sequentially.
Write	This enumeration literal shall indicate that the storage may be written multiple times.
WriteOnce	This enumeration literal shall indicate that the storage may be written only once.

9.12 DataStorageLoSCapabilities 1.1.1

Each instance of DataStorageLoSCapabilities describes capabilities of the system to support various data storage service options.

Actions (v1.1+) {}	object <i>read- write</i>	The Actions property shall contain the available actions for this resource.
Description	string <i>read- only (null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read- only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read- write (null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Name	string <i>read- only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read- write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
SupportedAccessCapabilities [{	array <i>read- write</i>	Each entry specifies a storage access capability.
StorageAccessCapability	string (enum) <i>read- write (null)</i>	StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage. See <i>StorageAccessCapability</i> in <i>Property Details</i> , below, for the possible values of this property.
}]		
SupportedLinesOfService [{	array <i>read- write</i>	The collection shall contain known and supported DataStorageLinesOfService.

@odata.id	string <i>read-only</i>	Link to a <i>DataStorageLineOfService</i> resource. See the Links section and the <i>DataStorageLineOfService</i> schema for details.
}]		
SupportedProvisioningPolicies [{	array <i>read-write</i>	This collection specifies supported storage allocation policies.
ProvisioningPolicy	string (enum) <i>read-write (null)</i>	The enumeration literals may be used to specify space provisioning policy. <i>See ProvisioningPolicy in Property Details, below, for the possible values of this property.</i>
}]		
SupportedRecoveryTimeObjectives [{	array <i>read-write</i>	This collection specifies supported expectations for time to access the primary store after recovery.
RecoveryAccessScope	string (enum) <i>read-write (null)</i>	The enumeration literals shall represent the relative time required to make a replica available as a source. <i>See RecoveryAccessScope in Property Details, below, for the possible values of this property.</i>
}]		
SupportsSpaceEfficiency	boolean <i>read-write (null)</i>	The value specifies whether storage compression or deduplication is supported. The default value for this property is false.

9.12.1 Property Details

9.12.1.1 ProvisioningPolicy:

The enumeration literals may be used to specify space provisioning policy.

string	Description
Fixed	This enumeration literal specifies storage shall be fully allocated.
Thin	This enumeration literal specifies storage may be over allocated.

9.12.1.2 RecoveryAccessScope:

The enumeration literals shall represent the relative time required to make a replica available as a source.

string	Description
Nearline	Access to a replica shall be consistent with switching access to a different path through a different front-end interconnection infrastructure. Some inconsistency may occur. A restore step may be required before recovery can commence.
Offline	Access to a replica may take a significant amount of time. No direct connection to the replica is assumed. Some inconsistency loss may occur. A restore step is likely to be required.
OnlineActive	Access to synchronous replicas shall be instantaneous.
OnlinePassive	Access to a synchronous replica shall be consistent with switching access to a different path the same front-end interconnect. A restore step shall not be required.

9.12.1.3 StorageAccessCapability:

StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage.

string	Description
Append	This enumeration literal shall indicate that the storage may be written only to append.
Execute	This value shall indicate that Execute access is allowed by the file share.
Read	This enumeration literal shall indicate that the storage may be read.
Streaming	This enumeration literal shall indicate that the storage may be read sequentially.
Write	This enumeration literal shall indicate that the storage may be written multiple times.
WriteOnce	This enumeration literal shall indicate that the storage may be written only once.

9.13 DriveCollection

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	The value of each entry of this property shall reference a Drive resource.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.14 EndpointCollection

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	The value of each member entry shall reference an Endpoint resource.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .

Oem {}	object <i>read- write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
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9.15 EndpointGroup 1.1.1

An EndpointGroup represents a collection of endpoints that are managed as a unit. By grouping together a collection of Endpoints, the EndpointGroup allows a collection of entities from differing sources or hosts to be manipulated uniformly and efficiently.

For any given EndpointGroup, all of its endpoints act exclusively as either server endpoints or client endpoints, as indicated by the value of the EndpointType property. Similarly, each Endpoint within a group has the same AccessState.

A server or client may define multiple EndpointGroup entities that access the same set of resources or functionality. A group may be designated as preferred, which signifies that access should be directed through its members in preference to the Endpoints listed in other EndpointGroups. If the value of EndpointType is Server, an EndpointGroup entity can be used to represent target port group as defined by SCSI. In that mode, the value of the TargetEndpointGroupIdentifier should correspond to the target port group number. (See clause "Device Identification VPD page" as defined in the SCSI Primary Commands specification.)

AccessState	string (enum) <i>read- write (null)</i>	Access to all associated resources through all aggregated endpoints shall share this access state. <i>See AccessState in Property Details, below, for the possible values of this property.</i>
Actions (v1.1+) {}	object <i>read- write</i>	The Actions property shall contain the available actions for this resource.
Description	string <i>read- only (null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Endpoints {	object <i>read- write (null)</i>	The value of each entry shall reference an Endpoint resource. Contains a link to a resource.
@odata.id	string <i>read- only</i>	Link to Collection of <i>Endpoint</i> . See the Endpoint schema for details.
}		
GroupType	string (enum) <i>read- write (null)</i>	The group contains only endpoints of a given type Client/Initiator or Server/Target. If this endpoint group represents a SCSI target group, the value of GroupType shall be Server. <i>See GroupType in Property Details, below, for the possible values of this property.</i>
Id	string <i>read- only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read- write (null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.

Links {	object <i>read-only</i>	This structure shall contain references to resources that are not contained within this resource.
Oem {}	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
}		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
Preferred	boolean <i>read-write (null)</i>	A value of True in this property shall indicate that access to the associated resource through the endpoints in this endpoint group is preferred over access through other endpoints. The default value for this property is false.
TargetEndpointGroupIdentifier	number <i>read-write (null)</i>	If this endpoint group represents a SCSI target group, the value of this property shall contain a SCSI defined identifier for this group, which corresponds to the TARGET PORT GROUP field in the REPORT TARGET PORT GROUPS response and the TARGET PORT GROUP field in an INQUIRY VPD page 85 response, type 5h identifier. See the INCITS SAM-5 specification.

9.15.1 Property Details

9.15.1.1 AccessState:

Access to all associated resources through all aggregated endpoints shall share this access state.

string	Description
NonOptimized	In the context of this enumeration literal, each endpoint shall be in an Active/NonOptimized state.
Optimized	In the context of this enumeration literal, each endpoint shall be in an Active/Optimized state.
Standby	In the context of this enumeration literal, each endpoint shall be in a Standby state.
Transitioning	In the context of this enumeration literal, at least one endpoint shall be transitioning to a new AccesState.
Unavailable	In the context of this enumeration literal, each endpoint shall be in an unavailable state.

9.15.1.2 GroupType:

The group contains only endpoints of a given type Client/Initiator or Server/Target. If this endpoint group represents a SCSI target group, the value of GroupType shall be Server.

string	Description
Client	The group contains the client (initiator) endpoints.
Server	The group contains the server (target) endpoints.

9.16 EndpointGroupCollection

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	The value of each member entry shall reference an endpoint group resource.
@odata.id	string <i>read-only</i>	Link to a EndpointGroup resource. See the Links section and the <i>EndpointGroup</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.17 FileShare 1.1.1

This resource shall be used to represent a shared set of files with a common directory structure.

Actions (v1.1+) { }	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
CASupported	boolean <i>read-write</i> <i>(null)</i>	The value of this property shall indicate that Continuous Availability is supported. Client/Server mediated recovery from network and server failure with application transparency. This property shall be NULL unless the FileSharingProtocols property includes SMB. The default value for this property is false.
DefaultAccessCapabilities [{	array <i>read-only</i>	The value of this property shall be an array containing entries for the default access capabilities for the file share. Each entry shall specify a default access privilege. The types of default access can include Read, Write, and/or Execute.
StorageAccessCapability	string (enum) <i>read-write</i> <i>(null)</i>	StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage. See <i>StorageAccessCapability</i> in <i>Property Details, below, for the possible values of this property</i> .
}]		
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
EthernetInterfaces {	object <i>read-only</i>	The value shall be a link to an EthernetInterfaceCollection with members that provide access to the file share.

@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}		
ExecuteSupport	boolean <i>read-only (null)</i>	The value of this property shall indicate whether Execute access is supported by the file share. The default value for this property is false.
FileSharePath	string <i>read-only (null)</i>	The value of this property shall be a path (relative to the file system root) to the exported file or directory on the file system where this file share is hosted.
FileShareQuotaType	string (enum) <i>read-write (null)</i>	If FileShareQuotaType is present, a value of Soft shall specify that quotas are not enforced, and a value of Hard shall specify that writes shall fail if the space consumed would exceed the value of the FileShareTotalQuotaBytes property. <i>See FileShareQuotaType in Property Details, below, for the possible values of this property.</i>
FileShareRemainingQuotaBytes	number (By) <i>read-write (null)</i>	If present, the value of this property shall indicate the remaining number of bytes that may be consumed by this file share.
FileShareTotalQuotaBytes	number (By) <i>read-write (null)</i>	If present, the value of this property shall indicate the maximum number of bytes that may be consumed by this file share.
FileSharingProtocols [{	array <i>read-only</i>	This property shall be an array containing entries for the file sharing protocols supported by this file share. Each entry shall specify a file sharing protocol supported by the file system.
FileProtocol	string (enum) <i>read-write (null)</i>	The values shall indicate the file sharing protocols supported by the file system. At least one value shall be present. <i>See FileProtocol in Property Details, below, for the possible values of this property.</i>
}]		
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Links {	object <i>read-only</i>	This property shall contain links to other resources that are related to this resource.
ClassOfService {	object <i>read-write (null)</i>	This value shall be a link to the ClassOfService for this file share. See the <i>ClassOfService</i> schema for details on this property.

@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
FileSystem {	object <i>read-only (null)</i>	The value shall be a link to the file system containing the file share. See the <i>FileSystem</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a FileSystem resource. See the Links section and the <i>FileSystem</i> schema for details.
}		
Oem {}	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
}		
LowSpaceWarningThresholdPercents []	array (%) (number, null) <i>read-write</i>	This property shall be an array containing entries for the percentages of file share capacity at which low space warning events are to be issued. A <code>LOW_SPACE_THRESHOLD_WARNING</code> event shall be triggered each time the remaining file share capacity value becomes less than one of the values in the array. The following shall be true: Across all CapacitySources entries, $percent = (SUM(AllocatedBytes) - SUM(ConsumedBytes)) / SUM(AllocatedBytes)$
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
RemainingCapacityPercent (v1.1+)	number <i>read-only (null)</i>	If present, this value shall return $\{(SUM(AllocatedBytes) - SUM(ConsumedBytes)) / SUM(AllocatedBytes)\} * 100$ represented as an integer value.
RootAccess	boolean <i>read-only (null)</i>	The value of this property shall indicate whether Root access is allowed by the file share. The default value for this property is false.
Status {}	object <i>read-only (null)</i>	This value of this property shall indicate the status of the file share. See the <i>Resource</i> schema for details on this property.
WritePolicy	string (enum) <i>read-only (null)</i>	The value of this property shall define how writes are replicated to the shared source. See <i>WritePolicy in Property Details, below, for the possible values of this property.</i>

9.17.1 Property Details

9.17.1.1 FileProtocol:

The values shall indicate the file sharing protocols supported by the file system. At least one value shall be present.

string	Description
NFSv3	This value shall indicate that NFSv3, as defined in RFC 1813, is supported by the file system.
NFSv4_0	This value shall indicate that NFSv4, as defined in RFC 7530, is supported by the file system.
NFSv4_1	This value shall indicate that NFSv4.1, as defined in RFC 5661, is supported by the file system.
SMBv2_0	This value shall indicate that Server Message Block version 2.0 is supported by the file system.
SMBv2_1	This value shall indicate that Server Message Block version 2.1 is supported by the file system.
SMBv3_0	This value shall indicate that Server Message Block version 3.0 is supported by the file system.
SMBv3_0_2	This value shall indicate that Server Message Block version 3.0.2 is supported by the file system.
SMBv3_1_1	This value shall indicate that Server Message Block version 3.1.1 is supported by the file system.

9.17.1.2 FileShareQuotaType:

If FileShareQuotaType is present, a value of Soft shall specify that quotas are not enforced, and a value of Hard shall specify that writes shall fail if the space consumed would exceed the value of the FileShareTotalQuotaBytes property.

string	Description
Hard	This value shall indicate that quotas are enabled and enforced.
Soft	This value shall indicate that quotas are enabled but not enforced.

9.17.1.3 StorageAccessCapability:

StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage.

string	Description
Append	This enumeration literal shall indicate that the storage may be written only to append.
Execute	This value shall indicate that Execute access is allowed by the file share.
Read	This enumeration literal shall indicate that the storage may be read.
Streaming	This enumeration literal shall indicate that the storage may be read sequentially.
Write	This enumeration literal shall indicate that the storage may be written multiple times.
WriteOnce	This enumeration literal shall indicate that the storage may be written only once.

9.17.1.4 WritePolicy:

The value of this property shall define how writes are replicated to the shared source.

string	Description
Active	This enumeration literal shall indicate Active-Active (i.e. bidirectional) synchronous updates.
Adaptive	This enumeration literal shall indicate that an implementation may switch between synchronous and asynchronous modes.
Asynchronous	This enumeration literal shall indicate Asynchronous updates.
Synchronous	This enumeration literal shall indicate Synchronous updates.

9.18 FileShareCollection

Description	string	Description
	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.

Members [{	array <i>read-only</i>	This property shall contain references to the members of this FileSystem collection.
@odata.id	string <i>read-only</i>	Link to a FileShare resource. See the Links section and the <i>FileShare</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.19 FileSystem 1.1.2

This resource shall be used to represent an instance of a hierarchical namespace of files.

AccessCapabilities [{	array <i>read-write</i>	This property shall be an array containing entries for the supported IO access capabilities. Each entry shall specify a current storage access capability.
StorageAccessCapability	string (enum) <i>read-write (null)</i>	StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage. See <i>StorageAccessCapability</i> in <i>Property Details</i> , below, for the possible values of this property.
}]		
Actions (v1.1+) {	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
BlockSizeBytes	number (By) <i>read-only (null)</i>	The value of this property shall be the block size of the file system in bytes.
Capacity {	object <i>read-write (null)</i>	The value of this property shall be the capacity allocated to the file system in bytes. See the <i>Capacity</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a Capacity resource. See the Links section and the <i>Capacity</i> schema for details.
}		
CapacitySources [{	array <i>read-write</i>	This property shall be an array containing entries for all the capacity sources for the file system. Each entry shall provide capacity allocation information from a named resource.

@odata.id	string <i>read-only</i>	Link to a CapacitySource resource. See the Links section and the <i>Capacity</i> schema for details.
}]		
CasePreserved	boolean <i>read-write</i> <i>(null)</i>	This property shall indicate that the case of file names is preserved by the file system. A value of True shall indicate that case of file names shall be preserved.
CaseSensitive	boolean <i>read-write</i> <i>(null)</i>	This property shall indicate that case sensitive file names are supported by the file system. A value of True shall indicate that file names are case sensitive.
CharacterCodeSet [{	array <i>read-write</i>	This property shall be an array containing entries for the character sets or encodings supported by the file system. Each entry shall specify a character set encoding supported by the file system.
CharacterCodeSet	string (enum) <i>read-write</i> <i>(null)</i>	The values shall indicate the character code standards supported by the file system. <i>See CharacterCodeSet in Property Details, below, for the possible values of this property.</i>
}]		
ClusterSizeBytes	number (By) <i>read-write</i> <i>(null)</i>	This value shall specify the minimum file allocation size imposed by the file system. This minimum allocation size shall be the smallest amount of storage allocated to a file by the file system. Under stress conditions, the file system may allocate storage in amounts smaller than this value.
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
ExportedShares {	object <i>read-only</i> <i>(null)</i>	This property shall be an array of exported file shares of this file system. Each entry shall define an exported file share of this file system. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>FileShare</i> . See the FileShare schema for details.
}		
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifiers (v1.1.1+) [{	array <i>read-only</i>	This property shall contain a list of all known durable names for this file system.
	<i>read-write</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.

}]		
ImportedShares (v1.0.1+) [{	array <i>read-only</i>	The value shall be an array of imported file shares.
@odata.id	string <i>read-only</i>	Link to a FileShare resource. See the Links section and the <i>FileShare</i> schema for details.
}]		
Links {	object <i>read-only</i>	This property shall contain links to other resources that are related to this resource.
ClassOfService {	object <i>read-only</i> (null)	This value shall be a link to the ClassOfService for this file system. See the <i>ClassOfService</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
Oem {}	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
ReplicaCollection [{	array <i>read-only</i>	This property shall be an array of links to replicas for this file system. Each entry shall be a link to a replica for this file system.
@odata.id	string <i>read-only</i>	Link to another FileSystem resource.
}]		
ReplicaCollection@odata.count	number <i>read-only</i>	The value of this property shall be an integer representing the number of items in a collection.
}		
LowSpaceWarningThresholdPercents []	array (%) (number, null) <i>read-write</i>	This property shall be an array containing entries for the percentages of file system capacity at which low space warning events are to be issued. A LOW_SPACE_THRESHOLD_WARNING event shall be triggered each time the remaining file system capacity value becomes less than one of the values in the array. The following shall be true: Across all CapacitySources entries, percent = (SUM(AllocatedBytes) - SUM(ConsumedBytes))/SUM(AllocatedBytes)
MaxFileNameLengthBytes	number (By) <i>read-write</i> (null)	If specified, this value shall specify the maximum length of a file name within the file system.

Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
RemainingCapacity {	object <i>read-only</i> <i>(null)</i>	The value of this property shall be the remaining capacity allocated to the file system in bytes. See the <i>Capacity</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a Capacity resource. See the Links section and the <i>Capacity</i> schema for details.
}		
RemainingCapacityPercent (v1.1+)	number <i>read-only</i> <i>(null)</i>	If present, this value shall return $\{[(\text{SUM}(\text{AllocatedBytes}) - \text{SUM}(\text{ConsumedBytes}))/\text{SUM}(\text{AllocatedBytes})]*100$ represented as an integer value.
ReplicaInfo	<i>read-write</i> <i>(null)</i>	See the http://redfish.dmtf.org/schemas/swordfish/v1/StorageReplicaInfo.json#/definitions/ReplicaInfo schema for details.

9.19.1 Property Details

9.19.1.1 CharacterCodeSet:

The values shall indicate the character code standards supported by the file system.

string	Description
ASCII	This value shall indicate that the ASCII character encoding is supported by the file system.
ExtendedUNIXCode	This value shall indicate that Extended Unix Code character encoding is supported by the file system.
ISO2022	This value shall indicate that ISO-2022 character encoding is supported by the file system.
ISO8859_1	This value shall indicate that ISO-8859-1 character encoding is supported by the file system.
UCS_2	This value shall indicate that the UCS-2 character encoding is supported by the file system.
UTF_16	This value shall indicate that the UTF-16 character encoding is supported by the file system.
UTF_8	This value shall indicate that the UTF-8 character encoding is supported by the file system.
Unicode	This value shall indicate that Unicode character encoding is supported by the file system.

9.19.1.2 StorageAccessCapability:

StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage.

string	Description
Append	This enumeration literal shall indicate that the storage may be written only to append.
Execute	This value shall indicate that Execute access is allowed by the file share.
Read	This enumeration literal shall indicate that the storage may be read.
Streaming	This enumeration literal shall indicate that the storage may be read sequentially.
Write	This enumeration literal shall indicate that the storage may be written multiple times.
WriteOnce	This enumeration literal shall indicate that the storage may be written only once.

9.20 FileSystemCollection

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	This property shall contain references to the members of this FileSystem collection.
@odata.id	string <i>read-only</i>	Link to a FileSystem resource. See the Links section and the <i>FileSystem</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.21 HostedStorageServices

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-write</i>	The value of each member entry shall reference a StorageService resource.
@odata.id	string <i>read-only</i>	Link to a StorageService resource. See the Links section and the <i>StorageService</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.22 IOConnectivityLineOfService 1.1.0

An IO connectivity service option may be used to specify the characteristics of storage connectivity.

AccessProtocols [{	array <i>read-write</i>	The Enumeration Literal shall specify the Access protocol for this service option. NOTE: If multiple protocols are specified, the corresponding MaxSupportedIOPS governs the max achieved across all protocol uses. This may be less than the sum of the individual max values, which may be specified by individual Line of Service entries.
Protocol	string (enum) <i>read-write</i> <i>(null)</i>	<i>See Protocol in Property Details, below, for the possible values of this property.</i>
}]		
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
MaxBytesPerSecond (v1.1+)	number (By/s) <i>read-write</i> <i>(null)</i>	The value shall be the maximum bytes per second that a connection can support.
MaxIOPS (v1.1+)	number ([IO]/s) <i>read-write</i> <i>(null)</i>	The value shall be the maximum IOs per second that the connection shall allow for the selected access protocol.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.22.1 Property Details

9.22.1.1 Protocol:

string	Description
AHCI	This value shall mean that this device conforms to the Intel Advanced Host Controller Interface Specification.
FC	This value shall mean that this device conforms to the T11 Fibre Channel Physical and Signaling Interface Specification.
FCP	This enumeration literal shall indicate the INCITS 481: Information technology - Fibre Channel Protocol for SCSI. The Fibre Channel SCSI Protocol.
FCoE	This value shall mean that this device conforms to the T11 FC-BB-5 Specification.
FICON	This enumeration literal shall indicate the (ANSI FC-SB-3 Single-Byte Command Code Sets-3 Mapping Protocol for the Fibre Channel(FC) protocol. FICON (Fibre CONnection) is the IBM proprietary name for this protocol.
FTP	This value shall mean that this device conforms to the File Transfer protocol as defined by RFC 114.
HTTP	This value shall mean that this device conforms to the Hypertext Transfer protocol as defined by RFC 2068 or RFC 2616.
HTTPS	This value shall mean that this device conforms to the Hypertext Transfer protocol as defined by RFC 2068 or RFC 2616 utilizing Transport Layer Security as specified by RFC 5246 or RFC 6176.

string	Description
NFSv3	This value shall mean that this device conforms to the Network File System protocol as defined by RFC 1813.
NFSv4	This value shall mean that this device conforms to the Network File System protocol as defined by RFC 3010 or RFC 5661.
NVMe	This value shall mean that this device conforms to the Non-Volatile Memory Host Controller Interface Specification Specification.
NVMeOverFabrics	This value shall mean that this device conforms to the NVM Express over Fabrics Specification.
PCIe	This value shall mean that this device conforms to the PCI-SIG PCI Express Base Specification only beyond that it uses some vendor proprietary mechanism to communicate.
RoCE	This value shall mean that this device conforms to the RDMA over Converged Ethernet protocol as defined by the Infiniband Architecture Specification.
RoCEv2	This value shall mean that this device conforms to the RDMA over Converged Ethernet version 2 protocol as defined by the Infiniband Architecture Specification.
SAS	This value shall mean that this device conforms to the T10 SAS Protocol Layer Specification.
SATA	This value shall mean that this device conforms to the Serial ATA International Organization Serial ATA Specification.
SFTP	This value shall mean that this device conforms to the File Transfer protocol as defined by RFC 114 utilizing Transport Layer Security as specified by RFC 5246 or RFC 6176.
SMB	This value shall mean that this device conforms to the Microsoft Server Message Block Protocol.
UHCI	This value shall mean that this device conforms to the Intel Universal Host Controller Interface Specification, Enhanced Host Controller Interface Specification, or the Extensible Host Controller Interface specification.
USB	This value shall mean that this device conforms to the USB Implementers Forum Universal Serial Bus Specification.
iSCSI	This value shall mean that this device conforms to the IETF Internet Small Computer Systems Interface (iSCSI) Specification.
iWARP	This value shall mean that this device conforms to the iWARP protocol as defined by RFC 5042 utilizing Transport Layer mechanisms as specified by RFC 5043 or RFC 5044.

9.23 IOConnectivityLoSCapabilities 1.1.1

Each instance of IOConnectivityLoSCapabilities describes capabilities of the system to support various IO Connectivity service options.

Actions (v1.1+) {}	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
Description	string <i>read-only (null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
MaxSupportedBytesPerSecond	number (By/s) <i>read-write (null)</i>	The value shall be the maximum bytes per second that a connection can support.

MaxSupportedIOPS (<i>v1.1+</i>)	number ([IO]/s) <i>read- write (null)</i>	The value shall be the maximum IOPS that a connection can support.
Name	string <i>read- only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read- write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
SupportedAccessProtocols [{	array <i>read- write</i>	Access protocols supported by this service option. NOTE: SMB+NFS* requires that SMB and at least one of NFSv3 or NFSv4 are also selected, (i.e. {'SMB', 'NFSv4', 'SMB+NFS*'}).
Protocol	string (enum) <i>read- write (null)</i>	<i>See Protocol in Property Details, below, for the possible values of this property.</i>
}]		
SupportedLinesOfService [{	array <i>read- write</i>	The collection shall contain known and supported IOConnectivityLinesOfService.
@odata.id	string <i>read- only</i>	Link to a IOConnectivityLineOfService resource. See the Links section and the <i>IOConnectivityLineOfService</i> schema for details.
}]		

9.23.1 Property Details

9.23.1.1 Protocol:

string	Description
AHCI	This value shall mean that this device conforms to the Intel Advanced Host Controller Interface Specification.
FC	This value shall mean that this device conforms to the T11 Fibre Channel Physical and Signaling Interface Specification.
FCP	This enumeration literal shall indicate the INCITS 481: Information technology - Fibre Channel Protocol for SCSI. The Fibre Channel SCSI Protocol.
FCoE	This value shall mean that this device conforms to the T11 FC-BB-5 Specification.
FICON	This enumeration literal shall indicate the (ANSI FC-SB-3 Single-Byte Command Code Sets-3 Mapping Protocol for the Fibre Channel(FC) protocol. FICON (Fibre CONnection) is the IBM proprietary name for this protocol.
FTP	This value shall mean that this device conforms to the File Transfer protocol as defined by RFC 114.
HTTP	This value shall mean that this device conforms to the Hypertext Transfer protocol as defined by RFC 2068 or RFC 2616.
HTTPS	This value shall mean that this device conforms to the Hypertext Transfer protocol as defined by RFC 2068 or RFC 2616 utilizing Transport Layer Security as specified by RFC 5246 or RFC 6176.
NFSv3	This value shall mean that this device conforms to the Network File System protocol as defined by RFC 1813.
NFSv4	This value shall mean that this device conforms to the Network File System protocol as defined by RFC 3010 or RFC 5661.
NVMe	This value shall mean that this device conforms to the Non-Volatile Memory Host Controller Interface Specification Specification.
NVMeOverFabrics	This value shall mean that this device conforms to the NVM Express over Fabrics Specification.

string	Description
PCIe	This value shall mean that this device conforms to the PCI-SIG PCI Express Base Specification only beyond that it uses some vendor proprietary mechanism to communicate.
RoCE	This value shall mean that this device conforms to the RDMA over Converged Ethernet protocol as defined by the Infiniband Architecture Specification.
RoCEv2	This value shall mean that this device conforms to the RDMA over Converged Ethernet version 2 protocol as defined by the Infiniband Architecture Specification.
SAS	This value shall mean that this device conforms to the T10 SAS Protocol Layer Specification.
SATA	This value shall mean that this device conforms to the Serial ATA International Organization Serial ATA Specification.
SFTP	This value shall mean that this device conforms to the File Transfer protocol as defined by RFC 114 utilizing Transport Layer Security as specified by RFC 5246 or RFC 6176.
SMB	This value shall mean that this device conforms to the Microsoft Server Message Block Protocol.
UHCI	This value shall mean that this device conforms to the Intel Universal Host Controller Interface Specification, Enhanced Host Controller Interface Specification, or the Extensible Host Controller Interface specification.
USB	This value shall mean that this device conforms to the USB Implementers Forum Universal Serial Bus Specification.
iSCSI	This value shall mean that this device conforms to the IETF Internet Small Computer Systems Interface (iSCSI) Specification.
iWARP	This value shall mean that this device conforms to the iWARP protocol as defined by RFC 5042 utilizing Transport Layer mechanisms as specified by RFC 5043 or RFC 5044.

9.24 IOPerformanceLineOfService 1.0.1

This structure may be used to define a service option related to IO performance.

AverageIOOperationLatencyMicroseconds	number (us) <i>read- write</i> (null)	The value shall be the expected average IO latency in microseconds calculated over sample periods (see SamplePeriodSeconds).
Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
IOOperationsPerSecondIsLimited	boolean <i>read- write</i> (null)	If true, the system should not allow IOPS to exceed MaxIOOperationsPerSecondPerTerabyte * VolumeSize. Otherwise, the system shall not enforce a limit. The default value for this property is false.
IOWorkload {	object <i>read- write</i> (null)	The value shall be a description of the expected workload. The workload provides the context in which the values of MaxIOOperationsPerSecondPerTerabyte and AverageIOOperationLatencyMicroseconds are expected to be achievable. See the <i>IOPerformanceLoSCapabilities</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a IOWorkload resource. See the Links section and the <i>IOPerformanceLoSCapabilities</i> schema for details.
}		
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
MaxIOOperationsPerSecondPerTerabyte	number (1/s/TBy) <i>read- write</i> (null)	The value shall be the amount of IOPS a volume of a given committed size in Terabytes can support. This IOPS density value is useful as a metric that is independent of capacity. Cost is a function of this value and the AverageIOOperationLatencyMicroseconds.

Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
SamplePeriod	string <i>read-write (null)</i>	The value shall be an ISO 8601 duration specifying the sampling period over which average values are calculated.

9.25 IOPerformanceLoSCapabilities 1.1.1

Each instance of IOPerformanceLoSCapabilities shall describe the capabilities of the system to support various IO performance service options.

Actions (v1.1+) {}	object <i>read-write</i>	The Actions property shall contain the available actions for this resource.
Description	string <i>read-only (null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
IOLimitingIsSupported	boolean <i>read-write (null)</i>	If true, the system should limit IOPS to MaxIOOperationsPerSecondPerTerabyte * (Volume Size in Terabytes). Otherwise, the system shall not enforce a limit. The default value for this property is false.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	<i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
MaxSamplePeriod	string (s) <i>read-write (null)</i>	The value shall be an ISO 8601 duration specifying the maximum sampling period over which average values are calculated.
MinSamplePeriod	string (s) <i>read-write (null)</i>	The value shall be an ISO 8601 duration specifying the minimum sampling period over which average values are calculated.
MinSupportedIoOperationLatencyMicroseconds	number (us) <i>read-write (null)</i>	The value shall be the minimum supported average IO latency in microseconds calculated over the SamplePeriod

Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
SupportedIOWorkloads [{}	array <i>read-write</i>	The value shall be a collection of supported workloads.
Components [{}	array <i>read-write</i>	The value shall be an array of IO workload component descriptions.
AverageIOBytes	number (By) <i>read-write (null)</i>	The value shall be the expected average I/O size.
Duration	string (s) <i>read-write (null)</i>	The value of each entry shall be an ISO 8601 duration that shall specify the expected length of time that this component is applied to the workload. This attribute shall be specified if a schedule is specified and otherwise shall not be specified.
IOAccessPattern	string (enum) <i>read-write (null)</i>	The enumeration literal shall be the expected access pattern. <i>See IOAccessPattern in Property Details, below, for the possible values of this property.</i>
PercentOfData	number (%) <i>read-write (null)</i>	The value shall be the expected percent of the data referenced by the workload that is covered by this component.
PercentOfIOPS	number (%) <i>read-write (null)</i>	The value shall be the expected percent of the total IOPS for this workload that is covered by this component
Schedule	 <i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/swordfish/v1/Schedule.json#/definitions/Schedule schema for details.
}]		
Name	string <i>read-write (null)</i>	The value shall be a name of the workload. It should be constructed as OrgID:WorkloadID. Examples: ACME:DSS, ACME:DSS-REP, ACME:Exchange, ACME:OLTP, ACME:OLTP-REPA. An organization may define a set of well known workloads.
}]		

SupportedLinesOfService [{	array	The value shall be a collection supported IO performance service options.
@odata.id	string	Link to a IOPerformanceLineOfService resource. See the Links section and the <i>IOPerformanceLineOfService</i> schema for details.
}]		

9.25.1 Property Details

9.25.1.1 IOAccessPattern:

The enumeration literal shall be the expected access pattern.

string	Description
RandomReadAgain	Use of this enumeration literal shall indicate an access pattern of random reads of cached data.
RandomReadNew	Use of this enumeration literal shall indicate an access pattern of random reads of uncached data.
ReadWrite	Use of this enumeration literal shall indicate a Uniform distribution of reads and writes.
SequentialRead	Use of this enumeration literal shall indicate a sequential read pattern of access.
SequentialWrite	Use of this enumeration literal shall indicate a sequential write pattern of access.

9.26 StorageGroup 1.0.1

The primary purposes of the collection shall be to govern access to the storage by clients or to add service requirements for the members of the collection. Access to the collected storage by a specified set of hosts shall be made available or unavailable atomically. Requirements specified by the class of service shall be satisfied by each collected element to which they apply. The storage group may contain: block, file, or object storage; local storage system access points through which the collection is made available; and hosts, or host access points to which the collection is made available.

AccessState	string (enum)	The value of this property shall describe the access characteristics of this storage group. All associated logical units through all aggregated ports shall share this access state. <i>See AccessState in Property Details, below, for the possible values of this property.</i>
Actions {	object	The Actions property shall contain the available actions for this resource.
#StorageGroup.ExposeVolumes { }	object	Exposes the storage of this group via the target endpoints named in the ServerEndpointGroups to the initiator endpoints named in the ClientEndpointGroups. The property VolumesAreExposed shall be set to true when this action is completed. <i>For more information, see the Action Details section below.</i>
#StorageGroup.HideVolumes { }	object	Hide the storage of this group from the initiator endpoints named in the ClientEndpointGroups. The property VolumesAreExposed shall be set to false when this action is completed. <i>For more information, see the Action Details section below.</i>
}		
ClientEndpointGroups [{	array	An array of references to groups of client-side endpoints that may be used to make requests to the storage exposed by this StorageGroup. If null, the implementation may allow access to the storage via any client-side endpoint. If empty, the implementation shall not allow access to the storage via any client-side endpoint.
@odata.id	string	Link to a EndpointGroup resource. See the Links section and the <i>EndpointGroup</i> schema for details.

}]		
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read-write</i> <i>(null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Links {	object <i>read-only</i>	This structure shall contain references to resources that are not contained within this resource.
ChildStorageGroups [{	array <i>read-write</i>	An array of references to StorageGroups are incorporated into this StorageGroup
@odata.id	string <i>read-only</i>	Link to another StorageGroup resource.
}]		
ChildStorageGroups@odata.count	number <i>read-only</i>	The value of this property shall be an integer representing the number of items in a collection.
ClassOfService {	object <i>read-write</i> <i>(null)</i>	The ClassOfService that all storage in this StorageGroup conforms to. See the <i>ClassOfService</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
Oem {	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
ParentStorageGroups [{	array <i>read-only</i>	An array of references to StorageGroups that incorporate this StorageGroup
@odata.id	string <i>read-only</i>	Link to another StorageGroup resource.

}]		
ParentStorageGroups@odata.count	number <i>read-only</i>	The value of this property shall be an integer representing the number of items in a collection.
}		
MembersAreConsistent	boolean <i>read-write (null)</i>	The value of this property shall be set to true if all members are in a consistent state. The default value for this property is false.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
ReplicaInfos [{	array <i>read-write</i>	This property shall describe the replication relationship between this storage group and a corresponding source and/or target storage group.
	<i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/swordfish/v1/StorageReplicaInfo.json#/definitions/ReplicaInfo schema for details.
}]		
ServerEndpointGroups [{	array <i>read-write</i>	An array of references to groups of server-side endpoints that may be used to make requests to the storage exposed by this storage group. If null, the implementation may allow access to the storage via any server-side endpoint. If empty, the implementation shall not allow access to the storage via any server-side endpoint.
@odata.id	string <i>read-only</i>	Link to a EndpointGroup resource. See the Links section and the <i>EndpointGroup</i> schema for details.
}]		
Status {}	object <i>read-write (null)</i>	This type shall contain any status or health properties of a resource. See the <i>Resource</i> schema for details on this property.
Volumes [{	array <i>read-write</i>	An array of references to volumes managed by this storage group.
@odata.id	string <i>read-only</i>	Link to a Volume resource. See the Links section and the <i>Volume</i> schema for details.
}]		
VolumesAreExposed	boolean <i>read-write (null)</i>	The value of this property shall be set to true if storage volumes are exposed to the paths defined by the client and server endpoints. The default value for this property is false.

9.26.1 Action Details

9.26.1.0.0.1 ExposeVolumes

Exposes the storage of this group via the target endpoints named in the ServerEndpointGroups to the initiator endpoints named in the ClientEndpointGroups. The property VolumesAreExposed shall be set to true when this action is completed.

(This action takes no parameters.)

9.26.1.0.0.2 HideVolumes

Hide the storage of this group from the initiator endpoints named in the ClientEndpointGroups. The property VolumesAreExposed shall be set to false when this action is completed.

(This action takes no parameters.)

9.26.2 Property Details

9.26.2.1 AccessState:

The value of this property shall describe the access characteristics of this storage group. All associated logical units through all aggregated ports shall share this access state.

string	Description
NonOptimized	In the context of this enumeration literal, each endpoint shall be in an Active/NonOptimized state.
Optimized	In the context of this enumeration literal, each endpoint shall be in an Active/Optimized state.
Standby	In the context of this enumeration literal, each endpoint shall be in a Standby state.
Transitioning	In the context of this enumeration literal, at least one endpoint shall be transitioning to a new AccesState.
Unavailable	In the context of this enumeration literal, each endpoint shall be in an unavailable state.

9.27 StorageGroupCollection

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	The value of each member entry shall reference a StorageGroup resource.
@odata.id	string <i>read-only</i>	Link to a StorageGroup resource. See the Links section and the <i>StorageGroup</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.28 StoragePool 1.1.1

A container of data storage capable of providing capacity conforming to one of its supported classes of service. The storage pool does not support IO to its data storage.

AllocatedPools {	object <i>read-only</i> <i>(null)</i>	The value of this property shall contain a reference to the collection of storage pools allocated from this storage pool. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>StoragePool</i> . See the <i>StoragePool</i> schema for details.
}		
AllocatedVolumes {	object <i>read-only</i> <i>(null)</i>	The value of this property shall contain a reference to the collection of volumes allocated from this storage pool. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>Volume</i> . See the <i>Volume</i> schema for details.
}		
BlockSizeBytes (<i>deprecated v1.1</i>)	number (By) <i>read-only</i> <i>(null)</i>	Maximum size in bytes of the blocks which form this Volume. If the block size is variable, then the maximum block size in bytes should be specified. If the block size is unknown or if a block concept is not valid (for example, with Memory), enter a 1. <i>Deprecated v1.1+. This property has been Depreciated in favor of StoragePool.v1_1_1.StoragePool.MaxBlockSizeBytes</i>
Capacity {	object <i>read-only</i> <i>(null)</i>	The value of this property shall provide an information about the actual utilization of the capacity within this storage pool. See the <i>Capacity</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a Capacity resource. See the Links section and the <i>Capacity</i> schema for details.
}		
CapacitySources [{	array <i>read-only</i>	Fully or partially consumed storage from a source resource. Each entry shall provide capacity allocation data from a named source resource.
@odata.id	string <i>read-only</i>	Link to a CapacitySource resource. See the Links section and the <i>Capacity</i> schema for details.
}]		
ClassesOfService {	object <i>read-write</i> <i>(null)</i>	This property shall contain references to all classes of service supported by this storage pool. Capacity allocated from this storage pool shall conform to one of the referenced classes of service. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>ClassOfService</i> . See the <i>ClassOfService</i> schema for details.
}		

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifier	 <i>read-write</i> <i>(null)</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Links {	object <i>read-only</i>	This structure shall contain references to resources that are not contained within this resource.
DefaultClassOfService {	object <i>read-write</i> <i>(null)</i>	If present, this property shall reference the default class of service for entities allocated from this storage pool. If the ClassesOfService collection is not empty, then the value of this property shall be one of its entries. If not present, the default class of service of the containing StorageService entity shall be used. See the <i>ClassOfService</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
Oem {	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
}		
LowSpaceWarningThresholdPercents []	array (%) (number, null) <i>read-write</i>	Each time the following value is less than one of the values in the array the LOW_SPACE_THRESHOLD_WARNING event shall be triggered: $percent = (SUM(AllocatedBytes) - SUM(ConsumedBytes)) / SUM(AllocatedBytes)$.
MaxBlockSizeBytes (v1.1.1+)	number (By) <i>read-only</i> <i>(null)</i>	If present, the value is the maximum block size of an allocated resource. If the block size is unknown or if a block concept is not valid (for example, with Memory), this property shall be NULL.
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
RemainingCapacityPercent (v1.1+)	number <i>read-only</i> <i>(null)</i>	If present, this value shall return $\{(SUM(AllocatedBytes) - SUM(ConsumedBytes)) / SUM(AllocatedBytes)\} * 100$ represented as an integer value.

Status {}	object <i>read-write</i> <i>(null)</i>	This type shall contain any status or health properties of a resource. See the <i>Resource</i> schema for details on this property.
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9.29 StoragePoolCollection

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{}	array <i>read-only</i>	The value of each member entry shall reference a StoragePool resource.
@odata.id	string <i>read-only</i>	Link to a StoragePool resource. See the Links section and the <i>StoragePool</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.30 StorageService 1.1.0

Collection of resources that the system can make available to one or more host systems. The collection can contain: block, file, or object storage; local system access points through which the collection is made available; hosts, or host access points to which the collection is made available.

Actions {	object <i>read-only</i>	The Actions property shall contain the available actions for this resource.
#StorageService.SetEncryptionKey {}	object <i>read-write</i>	This defines the name of the custom action supported on this resource. <i>For more information, see the Action Details section below.</i>
}		
ClassesOfService {	object <i>read-write</i> <i>(null)</i>	The value of each entry in the array shall reference a ClassOfService supported by this service. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>ClassOfService</i> . See the ClassOfService schema for details.
}		

ClientEndpointGroups {	object <i>read-write</i> <i>(null)</i>	The value of each entry in the array shall reference an EndpointGroup. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>EndpointGroup</i> . See the EndpointGroup schema for details.
}		
Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Drives {	object <i>read-only</i>	A collection that indicates all the drives managed by this storage service. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>Drive</i> . See the Drive schema for details.
}		
EndpointGroups {	object <i>read-write</i> <i>(null)</i>	The value of each entry in the array shall reference an EndpointGroup. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>EndpointGroup</i> . See the EndpointGroup schema for details.
}		
Endpoints {	object <i>read-only</i> <i>(null)</i>	The value of each entry in the array shall reference an Endpoint managed by this service. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>Endpoint</i> . See the Endpoint schema for details.
}		
FileSystems {	object <i>read-write</i>	An array of references to FileSystems managed by this storage service. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>FileSystem</i> . See the FileSystem schema for details.
}		
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.

Identifier	read-write (null)	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
Links {	object read-only	Contains links to other resources that are related to this resource.
DataProtectionLoSCapabilities {	object read-write (null)	The value shall reference the data protection capabilities of this service. See the <i>DataProtectionLoSCapabilities</i> schema for details on this property.
@odata.id	string read-only	Link to a DataProtectionLoSCapabilities resource. See the Links section and the <i>DataProtectionLoSCapabilities</i> schema for details.
}		
DataSecurityLoSCapabilities {	object read-write (null)	The value shall reference the data security capabilities of this service. See the <i>DataSecurityLoSCapabilities</i> schema for details on this property.
@odata.id	string read-only	Link to a DataSecurityLoSCapabilities resource. See the Links section and the <i>DataSecurityLoSCapabilities</i> schema for details.
}		
DataStorageLoSCapabilities {	object read-write (null)	The value shall reference the data storage capabilities of this service. See the <i>DataStorageLoSCapabilities</i> schema for details on this property.
@odata.id	string read-only	Link to a DataStorageLoSCapabilities resource. See the Links section and the <i>DataStorageLoSCapabilities</i> schema for details.
}		
DefaultClassOfService {	object read-write (null)	If present, this property shall reference the default class of service for entities allocated by this storage service. This default may be overridden by the DefaultClassOfService property values within contained StoragePools. See the <i>ClassOfService</i> schema for details on this property.
@odata.id	string read-only	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		
HostingSystem	read-write (null)	The value shall reference the ComputerSystem or StorageController that hosts this service.
IOConnectivityLoSCapabilities {	object read-write (null)	The value shall reference the IO connectivity capabilities of this service. See the <i>IOConnectivityLoSCapabilities</i> schema for details on this property.

@odata.id	string <i>read-only</i>	Link to a IOConnectivityLoSCapabilities resource. See the Links section and the <i>IOConnectivityLoSCapabilities</i> schema for details.
}		
IOPerformanceLoSCapabilities {	object <i>read-write</i> <i>(null)</i>	The value shall reference the IO performance capabilities of this service. See the <i>IOPerformanceLoSCapabilities</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a IOPerformanceLoSCapabilities resource. See the Links section and the <i>IOPerformanceLoSCapabilities</i> schema for details.
}		
Oem {}	object <i>read-write</i>	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
}		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
Redundancy [{}	array <i>read-only</i>	Redundancy information for the storage subsystem
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}]		
ServerEndpointGroups {	object <i>read-write</i> <i>(null)</i>	The value of each entry in the array shall reference a EndpointGroup. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>EndpointGroup</i> . See the EndpointGroup schema for details.
}		
Status {}	object <i>read-write</i> <i>(null)</i>	This type shall contain any status or health properties of a resource. See the <i>Resource</i> schema for details on this property.
StorageGroups {	object <i>read-only</i> <i>(null)</i>	The value of each entry in the array shall reference a StorageGroup. Contains a link to a resource.

@odata.id	string <i>read-only</i>	Link to Collection of <i>StorageGroup</i> . See the StorageGroup schema for details.
}		
StoragePools {	object <i>read-only</i>	An array of references to StoragePools. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>StoragePool</i> . See the StoragePool schema for details.
}		
StorageSubsystems {	object <i>read-only</i>	The value shall be a link to a collection of type StorageCollection having members that represent storage subsystems managed by this storage service.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}		
Volumes {	object <i>read-write</i>	An array of references to Volumes managed by this storage service. Contains a link to a resource.
@odata.id	string <i>read-only</i>	Link to Collection of <i>Volume</i> . See the Volume schema for details.
}		

9.30.1 Action Details

9.30.1.0.0.1 SetEncryptionKey

This defines the name of the custom action supported on this resource.

The following table shows the parameters for the action which are included in the POST body to the URI shown in the "Target" property of the Action.

{		
EncryptionKey	string <i>read-write</i>	This defines the property name for the action.
}		

9.31 StorageServiceCollection

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
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Members [{	array <i>read-only</i>	The value of each member entry shall reference a StorageService resource.
@odata.id	string <i>read-only</i>	Link to a StorageService resource. See the Links section and the <i>StorageService</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.32 StorageSystemCollection

Description	string <i>read-only</i> <i>(null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-only</i>	The value of each member entry shall reference a ComputerSystem resource that shall have a HostingRoles entry with a value of 'StorageServer'.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.

9.33 Volume 1.2.1

This resource shall be used to represent a volume, virtual disk, logical disk, LUN, or other logical storage for a Redfish implementation.

AccessCapabilities (<i>v1.1+</i>) [{	array <i>read-write</i>	Each entry shall specify a current storage access capability.
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StorageAccessCapability	string (enum) <i>read- write</i> <i>(null)</i>	StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage. <i>See StorageAccessCapability in Property Details, below, for the possible values of this property.</i>
}]		
Actions {	object <i>read- write</i>	The Actions property shall contain the available actions for this resource.
#Volume.CheckConsistency {}	object <i>read- write</i>	This defines the name of the custom action supported on this resource. <i>For more information, see the Action Details section below.</i>
#Volume.Initialize {}	object <i>read- write</i>	This defines the name of the custom action supported on this resource. If InitializeType is not specified in the request body, the InitializeType should be Fast. <i>For more information, see the Action Details section below.</i>
}		
AllocatedPools {	object <i>read- only</i> <i>(null)</i>	The value of this property shall contain references to all storage pools allocated from this volume. Contains a link to a resource.
@odata.id	string <i>read- only</i>	Link to Collection of <i>StoragePool</i> . See the <i>StoragePool</i> schema for details.
}		
BlockSizeBytes	number (By) <i>read- only</i> <i>(null)</i>	This property shall contain size of the smallest addressable unit of the associated volume.
Capacity {	object <i>read- write</i> <i>(null)</i>	Information about the utilization of capacity allocated to this storage volume. See the <i>Capacity</i> schema for details on this property.
@odata.id	string <i>read- only</i>	Link to a Capacity resource. See the Links section and the <i>Capacity</i> schema for details.
}		
CapacityBytes	number (By) <i>read- only</i> <i>(null)</i>	This property shall contain the size in bytes of the associated volume.
CapacitySources (<i>v1.1+</i>) [{	array <i>read- write</i>	Fully or partially consumed storage from a source resource. Each entry provides capacity allocation information from a named source resource.

@odata.id	string <i>read-only</i>	Link to a CapacitySource resource. See the Links section and the <i>Capacity</i> schema for details.
}]		
Description	string <i>read-only (null)</i>	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Encrypted	boolean <i>read-write (null)</i>	This property shall contain a boolean indicator if the Volume is currently utilizing encryption or not.
EncryptionTypes [{	array <i>read-write</i>	This property shall contain the types of encryption used by this Volume.
EncryptionTypes	string (enum) <i>read-write</i>	See <i>EncryptionTypes</i> in Property Details, below, for the possible values of this property.
}]		
IOStatistics	 <i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/swordfish/v1/IOStatistics.json#/definitions/IOStatistics schema for details.
Id	string <i>read-only</i>	This property represents an identifier for the resource. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Identifiers [{	array <i>read-write</i>	This property shall contain a list of all known durable names for the associated volume.
	 <i>read-write</i>	See the http://redfish.dmtf.org/schemas/v1/Resource.json#/definitions/Identifier schema for details.
}]		
Links {	object <i>read-write</i>	The Links property, as described by the Redfish Specification, shall contain references to resources that are related to, but not contained by (subordinate to), this resource.
ClassOfService (v1.1+) {	object <i>read-only (null)</i>	This property shall contain a reference to the ClassOfService that this storage volume conforms to. See the <i>ClassOfService</i> schema for details on this property.
@odata.id	string <i>read-only</i>	Link to a ClassOfService resource. See the Links section and the <i>ClassOfService</i> schema for details.
}		

DedicatedSpareDrives (v1.2+) [{	array read-only	The value of this property shall be a reference to the resources that this volume is associated with and shall reference resources of type Drive. This property shall only contain references to Drive entities which are currently assigned as a dedicated spare and are able to support this Volume.
@odata.id	string read-only	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}]		
DedicatedSpareDrives@odata.count (v1.2+)	number read-only	The value of this property shall be an integer representing the number of items in a collection.
Drives [{	array read-only	The value of this property shall be a reference to the resources that this volume is associated with and shall reference resources of type Drive. This property shall only contain references to Drive entities which are currently members of the Volume, not hot spare Drives which are not currently a member of the volume.
@odata.id	string read-only	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}]		
Drives@odata.count	number read-only	The value of this property shall be an integer representing the number of items in a collection.
Oem { }	object read-write	This object represents the Oem property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. See the <i>Resource</i> schema for details on this property.
}		
LowSpaceWarningThresholdPercents (v1.1+) []	array (%) (number, null) read-write	Each time the following value is less than one of the values in the array the LOW_SPACE_THRESHOLD_WARNING event shall be triggered: Across all CapacitySources entries, percent = (SUM(AllocatedBytes) - SUM(ConsumedBytes))/SUM(AllocatedBytes).
Manufacturer (v1.1+)	string read-only (null)	This property shall contain a value that represents the manufacturer or implementer of the storage volume.
MaxBlockSizeBytes (v1.1+)	number (By) read-only (null)	This property shall contain size of the largest addressable unit of this storage volume.
Model (v1.1+)	string read-only (null)	The value is assigned by the manufacturer and shall represents a specific storage volume implementation.
Name	string read-only	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .

Oem {}	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.
Operations [{	array <i>read-write</i>	This property shall contain a list of all currently running on the Volume.
AssociatedTask {	object <i>read-only</i>	This resource shall be used to represent a task for a Redfish implementation.
@odata.id	string <i>read-only</i>	The value of this property shall be the unique identifier for the resource and it shall be of the form defined in the Redfish specification.
}		
OperationName	string <i>read-only (null)</i>	The name of the operation.
PercentageComplete	number <i>read-only (null)</i>	The percentage of the operation that has been completed.
}]		
OptimumIOSizeBytes	number (By) <i>read-only (null)</i>	This property shall contain the optimum IO size to use when performing IO on this volume. For logical disks, this is the stripe size. For physical disks, this describes the physical sector size.
RemainingCapacityPercent (v1.2+)	number <i>read-only (null)</i>	If present, this value shall return $\{[(SUM(AllocatedBytes) - SUM(ConsumedBytes)]/SUM(AllocatedBytes))*100$ represented as an integer value.
ReplicaInfos (v1.1+) [{	array <i>read-only</i>	This property shall describe the replica relationship between this storage volume and a corresponding source and/or target volume.
	<i>read-write (null)</i>	See the http://redfish.dmtf.org/schemas/swordfish/v1/StorageReplicaInfo.json#/definitions/ReplicaInfo schema for details.
}]		
Status {}	object <i>read-write</i>	This type shall contain any status or health properties of a resource. See the <i>Resource</i> schema for details on this property.
StorageGroups {	object <i>read-only (null)</i>	The value of this property shall contain references to all storage groups that include this volume. Contains a link to a resource.

@odata.id	string <i>read-only</i>	Link to Collection of <i>StorageGroup</i> . See the <i>StorageGroup</i> schema for details.
}		
VolumeType	string (enum) <i>read-only</i> (null)	This property shall contain the type of the associated Volume. <i>See VolumeType in Property Details, below, for the possible values of this property.</i>

9.33.1 Action Details

9.33.1.0.0.1 CheckConsistency

This defines the name of the custom action supported on this resource.

(This action takes no parameters.)

9.33.1.0.0.2 Initialize

This defines the name of the custom action supported on this resource. If *InitializeType* is not specified in the request body, the *InitializeType* should be *Fast*.

The following table shows the parameters for the action which are included in the POST body to the URI shown in the "Target" property of the Action.

{		
InitializeType	string (enum) <i>read-write</i>	This defines the property name for the action. <i>See InitializeType in Property Details, below, for the possible values of this property.</i>
}		

9.33.2 Property Details

9.33.2.1 EncryptionTypes:

string	Description
ControllerAssisted	The volume is being encrypted by the storage controller entity.
NativeDriveEncryption	The volume is utilizing the native drive encryption capabilities of the drive hardware.
SoftwareAssisted	The volume is being encrypted by software running on the system or the operating system.

9.33.2.2 InitializeType:

This defines the property name for the action.

string	Description
Fast	The volume is prepared for use quickly, typically by erasing just the beginning and end of the space so that partitioning can be performed.
Slow	The volume is prepared for use slowly, typically by completely erasing the volume.

9.33.2.3 StorageAccessCapability:

StorageAccessCapability enumeration literals may be used to describe abilities to read or write storage.

string	Description
Append	This enumeration literal shall indicate that the storage may be written only to append.
Execute	This value shall indicate that <i>Execute</i> access is allowed by the file share.

string	Description
Read	This enumeration literal shall indicate that the storage may be read.
Streaming	This enumeration literal shall indicate that the storage may be read sequentially.
Write	This enumeration literal shall indicate that the storage may be written multiple times.
WriteOnce	This enumeration literal shall indicate that the storage may be written only once.

9.33.2.4 VolumeType:

This property shall contain the type of the associated Volume.

string	Description
Mirrored	The volume is a mirrored device.
NonRedundant	The volume is a non-redundant storage device.
RawDevice	The volume is a raw physical device without any RAID or other virtualization applied.
SpannedMirrors	The volume is a spanned set of mirrored devices.
SpannedStripesWithParity	The volume is a spanned set of devices which uses parity to retain redundant information.
StripedWithParity	The volume is a device which uses parity to retain redundant information.

9.34 VolumeCollection

Description	string <i>read-only</i> (null)	This object represents the Description property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification.
Members [{	array <i>read-write</i>	The value of each member entry shall reference a Volume resource.
@odata.id	string <i>read-only</i>	Link to a Volume resource. See the Links section and the <i>Volume</i> schema for details.
}]		
Name	string <i>read-only</i>	This object represents the Name property. All values for resources described by this schema shall comply to the requirements as described in the Redfish specification. The value of this string shall be of the format for the reserved word <i>Name</i> .
Oem { }	object <i>read-write</i>	The value of this string shall be of the format for the reserved word <i>Oem</i> . See the <i>Resource</i> schema for details on this property.