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System for Cross-Domain Identity Management: Core Schema draft-ietf-scim-core-schema-08

Abstract

The System for Cross-Domain Identity Management (SCIM) specification is designed to make managing user identity in cloud based applications and services easier. The specification suite builds upon experience with existing schemas and deployments, placing specific emphasis on simplicity of development and integration, while applying existing authentication, authorization, and privacy models. Its intent is to reduce the cost and complexity of user management operations by providing a common user schema and extension model, as well as binding documents to provide patterns for exchanging this schema using standard protocols. In essence, make it fast, cheap, and easy to move identity in to, out of, and around the cloud.

This document provides a platform neutral schema and extension model for representing users and groups in JSON format. This schema is intended for exchange and use with cloud service providers. An HTTP protocol binding document is also provided.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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1. Introduction and Overview

While there are existing standards for describing and exchanging user information, many of these standards can be difficult to implement and/or use; e.g., their wire protocols do not easily traverse firewalls and/or are not easily layered onto existing web protocols. As a result, many cloud providers implement non-standardized protocols for managing users within their services. This increases both the cost and complexity associated with organizations adopting products and services from multiple cloud providers as they must perform redundant integration development. Similarly, cloud services providers seeking to inter-operate with multiple application marketplaces or cloud identity providers must be redundantly integrated.

SCIM seeks to simplify this problem through a simple to implement specification suite that provides a common user schema and extension model, as well as binding documents to provide patterns for exchanging this schema via an HTTP based protocol. It draws inspiration and best practice, building upon existing user protocols and schemas from a wide variety of sources including, but not limited to, existing services exposed by cloud providers, PortableContacts, vCards, and LDAP directory services.

This document provides a JSON based schema and extension model for representing users and groups, as well as service provider configuration. This schema is intended for exchange and use with cloud service providers and other cross-domain scenarios. An HTTP protocol binding document is provided separately.

1.1. Requirements Notation and Conventions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

Throughout this document, values are quoted to indicate that they are to be taken literally. When using these values in protocol messages, the quotes MUST NOT be used as part of the value.

1.2. Definitions

Service Provider: An HTTP web application that provides identity information via the SCIM protocol.

Client: A website or application that uses the SCIM protocol to manage identity data maintained by the service provider. The client initiates SCIM HTTP requests to a target service provider.

Resource: The service provider managed artifact containing one or more attributes; e.g., "User" or "Group".

Resource Type: A type of a resource that is managed by a service provider. The resource type defines the resource name, endpoint URL, Schemas, and other meta-data which indicate where a resource is managed and how it is composed; e.g., "User" or "Group".

Schema: A collection of Attribute Definitions that describe the contents of an entire or partial resource; e.g., "urn:ietf:params:scim:schemas:core:2.0:User".

Singular Attribute: A resource attribute that contains 0..1 values; e.g., "displayName".

Multi-valued Attribute: A resource attribute that contains 0..n values; e.g., "emails".

Simple Attribute: A singular or multi-valued attribute whose value is a primitive; e.g., "String".

Complex Attribute: A singular or multi-valued attribute whose value is a composition of one or more simple attributes; e.g., "addresses".

Sub-Attribute: A simple attribute contained within a complex attribute.

2. SCIM Schema Structure

SCIM schema provides a minimal core schema for representing users and groups (resources), encompassing common attributes found in many existing deployments and schemas.

A resource is a collection of attributes identified by one or more schemas. Minimally, an attribute consists of the attribute name and at least one simple or complex value either of which may be multi-valued. SCIM schema defines the data type, plurality and other distinguishing features of an attribute. Unless otherwise specified all attributes are modifiable by consumers.

Attribute names SHOULD be camelCased. SCIM resources are represented in JSON [RFC7159] and MUST specify schema via the "schemas" attribute per Section 4.2.

Attribute names MUST conform to the following ABNF [RFC5234] rules:

```
ATTRNAME   = ALPHA *(nameChar)
nameChar   = "-" / "_" / DIGIT / ALPHA
```

Figure 1: ABNF for Attribute Names

2.1. Attribute Data Types

Attribute data types are derived from JSON [RFC7159] and unless otherwise specified have the following characteristics (see Section 10 for attribute characteristic definitions):

are optional (is not required).

are case insensitive (caseExact=false),

are modifiable (mutability is readWrite),

are returned in response to queries (returned by default),

are not unique (uniqueness=none), and,

of type String (Section 2.1.1).

The JSON format defines a limited set of data types, hence, where appropriate, alternate JSON representations derived from XML Schema [XML-Schema] are defined below. SCIM extensions SHOULD NOT introduce new data types.

2.1.1. String

A sequence of zero or more Unicode characters encoded using UTF-8 as per [RFC2277] and [RFC3629]. The JSON format is defined in Section 7 [RFC7159]. A "String" attribute MAY specify a required data format. Additionally, when canonical values are specified service providers SHOULD conform to those values if appropriate, but MAY provide alternate "String" values to represent additional values.

2.1.2. Boolean

The literal "true" or "false". The JSON format is defined in Section 3 [RFC7159].

2.1.3. Decimal

A real number with at least one digit to the left and right of the period. The JSON format is defined in Section 6 [RFC7159].

2.1.4. Integer

A decimal number with no fractional digits. The JSON format is defined in Section 6 [RFC7159] with the additional constraint that the value MUST NOT contain fractional or exponent parts.

2.1.5. DateTime

A DateTime value (e.g. 2008-01-23T04:56:22Z). The attribute value MUST be encoded as a valid xsd:dateTime as specified in Section 3.2.7 [XML-Schema].

Values represented in JSON MUST conform to the XML constraints above and are represented as a JSON String per Section 7 [RFC7159].

2.1.6. Binary

Arbitrary binary data. The attribute value MUST be encoded as a valid xsd:base64Binary as specified in Section 3.2.16 [XML-Schema].

Values represented in JSON MUST conform to the XML constraints above and are represented as a JSON String per Section 2.7 [RFC7159].

2.1.7. Reference

A reference to a SCIM resource. The value MUST be the absolute or relative URI of the target resource. Relative URIs should be resolved as specified in Section 5.2 [RFC3986]. The base URI for relative URI resolution MUST include all URI components and path segments up to but not including the Endpoint URI; e.g., the base URI for a request to "https://example.com/v2/Users/2819c223-7f76-453a-919d-413861904646" would be "https://example.com/v2/" and the relative URI for this resource would be "Users/2819c223-7f76-453a-919d-413861904646".

Performing a GET operation on a reference URI MUST return the target resource or an appropriate HTTP response code. The service provider MAY optionally choose to enforce referential integrity for references.

By convention, a reference is commonly represented as a "$ref" sub-attribute in complex or multi-valued attributes, however this is OPTIONAL.

2.1.8. Complex

A singular or multi-valued attribute whose value is a composition of one or more simple Attributes. The JSON format is defined in Section 4 [RFC7159].

2.2. Multi-valued Attributes

Multi-valued attributes are unordered lists of attributes. Each attribute MAY contain Sub-Attributes and therefore multi-valued attributes may contain complex attributes. The sub-attributes below are considered normative and when specified SHOULD be used as defined.

type A label indicating the attribute's function; e.g., "work" or "home".

primary A boolean value indicating the 'primary' or preferred attribute value for this attribute, e.g. the preferred mailing address or primary e-mail address. The primary attribute value "true" MUST appear no more than once.

display A human readable name, primarily used for display purposes and has a mutability of "immutable".

operation The operation to perform on the multi-valued attribute during a PATCH request. The only valid value is "delete", which signifies that this instance should be removed from the resource.

value The attribute's significant value; e.g., the e-mail address, phone number, etc.

$ref The reference URI of the target resource, if the attribute is a reference.

When returning multi-valued attributes, service providers SHOULD canonicalize the value returned, if appropriate (e.g. for e-mail addresses and URLs). Service providers MAY return the same value more than once with different types (e.g. the same e-mail address may used for work and home), but SHOULD NOT return the same (type, value) combination more than once per Attribute, as this complicates processing by the Consumer.

2.3. Unassigned and Null Values

Unassigned attributes, the null value, or empty array (in the case of a multi-valued attribute) SHALL be considered to be equivalent in "state". Assigning an attribute with the value "null" or an empty array (in the case of multi-valued attributes) has the effect of making the attribute "unassigned". When an resource is expressed in JSON form, unassigned attributes, though they are defined in schema, MAY be omitted for compactness.

3. Schema Extension Model

SCIM schema follows an object extension model similar to ObjectClasses used in LDAP. Unlike LDAP there is no inheritance model; all extensions are additive (similar to LDAP Auxiliary Object Class [RFC4512]). Each "schemas" value indicates additive schema that may exist in a SCIM resource representation. The "schemas" attribute MUST contain at least one value which SHALL be the base schema for the resource. The "schemas" attribute MAY contain additional values indicating extended schemas that are in use. Schema extensions SHOULD NOT redefine any attributes defined in this specification and SHOULD follow conventions defined in this specification. Except for the base object schema, the schema extension URI SHALL be used as a JSON container to distinguish attributes belonging to the extension namespace from base schema attributes. See Figure 4 for an example JSON representation of an extended User.

In order to determine which "schemas" URI value is the base schema and which is extended schema for any given resource, the resource's

"resourceType" attribute value MAY be used to retrieve the resource's "ResourceType" schema (Section 9). See example "ResourceType" representation in Figure 7.

4. SCIM Core Schema

4.1. Common Schema Attributes

Each SCIM resource (Users, Groups, etc.) includes the following common attributes. These attributes MUST be included in all resources, including any extended resource types. Common attributes are considered to be part of every base resource schema and do not use their own schemas URI and SHALL not be considered schema extensions.

id A unique identifier for a SCIM resource as defined by the service provider. Each representation of the resource MUST include a non-empty "id" value. This identifier MUST be unique across the service provider's entire set of resources. It MUST be a stable, non-reassignable identifier that does not change when the same resource is returned in subsequent requests. The value of the "id" attribute is always issued by the service provider and MUST NOT be specified by the client. The string "bullkId" is a reserved keyword and MUST NOT be used within any unique identifier value. REQUIRED and has a mutability of "readOnly".

externalId An identifier for the resource as defined by the client. The "externalId" may simplify identification of the resource between client and service provider by allowing the client to use a filter to locate the resource with its own identifier, obviating the need to store a local mapping between the local identifier of the resource and the identifier used by the service provider. Each resource MAY include a non-empty externalId value. The value of the "externalId" attribute is always issued by the client and can never be specified by the service provider. The service provider MUST always interpret the externalId as scoped to the client's tenant.

meta A complex attribute containing resource metadata. All sub-attributes are OPTIONAL

resourceType The name of the resource type of the resource. This attribute has mutability of "readOnly".

created The DateTime the resource was added to the service provider. The attribute MUST be a DateTime. This attribute has mutability of "readOnly".

lastModified The most recent DateTime the details of this resource were updated at the service provider. If this resource has never been modified since its initial creation, the value MUST be the same as the value of created. The attribute MUST be a DateTime and has mutability of "readOnly".

location The URI of the resource being returned. This value MUST be the same as the Location HTTP response header. The attribute has mutability of "readOnly".

version The version of the resource being returned. This value must be the same as the ETag HTTP response header. The attribute has mutability of "readOnly".

4.2. "schemas" Attribute

SCIM supports resources of different types, with extensible schemas. Each resource MUST be indicated using fully qualified URLs.

A "schemas" attribute contains URIs which are used to indicate the namespace and version of SCIM schema as well as any schema extensions. The first value SHALL indicate the base schema for the resource.

schemas The schemas attribute is an array of Strings which allows introspection of the supported schema version for a SCIM representation as well any schema extensions supported by that representation. Each String value must be a unique URI. This specification defines URIs for User, Group, and a standard enterprise-user extension. All representations of SCIM schema MUST include a non-zero value array with value(s) of the URIs supported by that representation. The schemas attribute for a resource MUST only contain values defined as "schema" and "schemaExtensions" for the resource's resource type. Duplicate values MUST NOT be included. Value order is not specified and MUST not impact behavior. REQUIRED.

5. SCIM User Schema

SCIM provides a schema for representing Users, identified using the following URI: "urn:ietf:params:scim:schemas:core:2.0:User". The following attributes are defined in addition to those attributes defined in SCIM Core Schema:

5.1. Singular Attributes

userName Unique identifier for the user, typically used by the user to directly authenticate to the service provider. Often displayed to the user as their unique identifier within the system (as opposed to id or externalId, which are generally opaque and not user-friendly identifiers). Each User MUST include a non-empty userName value. This identifier MUST be unique across the client's entire set of Users. RECOMMENDED.

name The components of the user's real name. Service providers MAY return just the full name as a single string in the formatted sub-attribute, or they MAY return just the individual component attributes using the other sub-attributes, or they MAY return both. If both variants are returned, they SHOULD be describing the same name, with the formatted name indicating how the component attributes should be combined.

formatted The full name, including all middle names, titles, and suffixes as appropriate, formatted for display (e.g. "Ms. Barbara Jane Jensen, III.").

familyName The family name of the User, or last name in most Western languages (e.g. "Jensen" given the full name "Ms. Barbara Jane Jensen, III.").

givenName The given name of the User, or first name in most Western languages (e.g. "Barbara" given the full name "Ms. Barbara Jane Jensen, III.").

middleName The middle name(s) of the User (e.g. "Jane" given the full name "Ms. Barbara Jane Jensen, III.").

honorificPrefix The honorific prefix(es) of the User, or title in most Western languages (e.g. "Ms." given the full name "Ms. Barbara Jane Jensen, III.").

honorificSuffix The honorific suffix(es) of the User, or suffix in most Western languages (e.g. "III." given the full name "Ms. Barbara Jane Jensen, III.").

displayName The name of the user, suitable for display to end-users. Each user returned MAY include a non-empty displayName value. The name SHOULD be the full name of the User being described if known (e.g. "Babs Jensen" or "Ms. Barbara J Jensen, III"), but MAY be a username or handle, if that is all that is available (e.g. "bjensen"). The value provided SHOULD be the primary textual

label by which this User is normally displayed by the service provider when presenting it to end-users.

nickName The casual way to address the user in real life, e.g. "Bob" or "Bobby" instead of "Robert". This attribute SHOULD NOT be used to represent a User's username (e.g. bjensen or mpepperidge).

profileUrl A fully qualified URL to a page representing the user's online profile.

title The user's title, such as "Vice President".

userType Used to identify the organization to user relationship. Typical values used might be "Contractor", "Employee", "Intern", "Temp", "External", and "Unknown" but any value may be used.

preferredLanguage Indicates the user's preferred written or spoken languages and is generally used for selecting a localized User interface. The value indicates the set of natural languages that are preferred. The format of the value is same as the Accept-Language header field (not including "Accept-Language:") of HTTP and is specified in Section 5.3.5 of [RFC7231]. The intent of this value is to enable cloud applications to perform matching of language tags [RFC4647] to the user's language preferences regardless of what may be indicated by a user agent (which might be shared), or in a non-user present interaction (such as in a delegated OAuth2 [RFC6749] style interaction) where normal HTTP Accept-Language header negotiation cannot take place.

locale Used to indicate the User's default location for purposes of localizing items such as currency, date time format, numerical representations, etc. A valid value is a language tag as defined in [RFC5646]. Computer languages are explicitly excluded.

A language tag is a sequence of one or more case-insensitive sub-tags, each separated by a hyphen character ("-", %x2D). For backwards compatibility reasons, servers MAY accept tags separated by an underscore character ("_", %5F). In most cases, a language tag consists of a primary language sub-tag that identifies a broad family of related languages (e.g., "en" = English) which is optionally followed by a series of sub-tags that refine or narrow that language's range (e.g., "en-CA" = the variety of English as communicated in Canada). Whitespace is not allowed within a language tag. Example tags include:

fr, en-US, es-419, az-Arab, x-pig-latin, man-Nkoo-GN

See [RFC5646] for further information.

timezone The User's time zone in IANA Time Zone database format [RFC6557], also known as "Olson" timezone database format [Olson-TZ] ; For example: "America/Los_Angeles".

active A Boolean value indicating the user's administrative status. The definitive meaning of this attribute is determined by the service provider. As a typical example, a value of true infers the user is able to login while a value of false implies the user's account has been suspended.

password The user's clear text password. This attribute is intended to be used as a means to specify an initial password when creating a new User or to reset an existing User's password. Password policies and the ability to update or set passwords are out of scope of this document. The mutability of this attribute is "writeOnly" indicating the value MUST NOT be returned by a service provider in any form.

5.2. Multi-valued Attributes

The following multi-valued attributes are defined.

emails E-mail addresses for the User. The value SHOULD be canonicalized by the service provider, e.g. "bjensen@example.com" instead of "bjensen@EXAMPLE.COM". Canonical type values of "work", "home", and "other".

phoneNumbers Phone numbers for the user. The value SHOULD be canonicalized by the service provider according to format in [RFC3966] e.g. 'tel:+1-201-555-0123'. Canonical type values of "work", "home", "mobile", "fax", "pager", and "other".

ims Instant messaging address for the user. No official canonicalization rules exist for all instant messaging addresses, but service providers SHOULD, when appropriate, remove all whitespace and convert the address to lowercase. Instead of the standard canonical values for type, this attribute defines the following canonical values to represent currently popular IM services: "aim", "gtalk", "icq", "xmpp", "msn", "skype", "qq", "yahoo", and "other".

photos URL of a photo of the User. The value SHOULD be a canonicalized URL, and MUST point to an image file (e.g. a GIF, JPEG, or PNG image file) rather than to a web page containing an image. Service providers MAY return the same image at different sizes, though it is recognized that no standard for describing

images of various sizes currently exists. Note that this attribute SHOULD NOT be used to send down arbitrary photos taken by this user, but specifically profile photos of the user suitable for display when describing the user. Instead of the standard canonical values for type, this attribute defines the following canonical values to represent popular photo sizes: "photo", "thumbnail".

addresses A physical mailing address for this user. Canonical type values of "work", "home", and "other". The value attribute is a complex type with the following sub-attributes. All sub-attributes are OPTIONAL.

formatted The full mailing address, formatted for display or use with a mailing label. This attribute MAY contain newlines.

streetAddress The full street address component, which may include house number, street name, P.O. box, and multi-line extended street address information. This attribute MAY contain newlines.

locality The city or locality component.

region The state or region component.

postalCode The zipcode or postal code component.

country The country name component. When specified the value MUST be in ISO 3166-1 alpha 2 "short" code format [ISO3166] ; e.g., the United States and Sweden are "US" and "SE", respectively.

groups A list of groups that the user belongs to, either thorough direct membership, nested groups, or dynamically calculated. The values are meant to enable expression of common group or role based access control models, although no explicit authorization model is defined. It is intended that the semantics of group membership and any behavior or authorization granted as a result of membership are defined by the service provider. The canonical types "direct" and "indirect" are defined to describe how the group membership was derived. Direct group membership indicates the user is directly associated with the group and SHOULD indicate that clients may modify membership through the "Group" resource. Indirect membership indicates user membership is transitive or dynamic and implies that clients cannot modify indirect group membership through the "Group" resource but MAY modify direct group membership through the "Group" resource which MAY influence indirect memberships. If the SCIM service provider exposes a

Group resource, the "value" sub-attribute MUST be the "id" and the "$ref" sub-attribute must be the URI of the corresponding "Group" resources to which the user belongs. Since this attribute has a mutability of "readOnly", group membership changes MUST be applied via the Group Resource (Section 7). The attribute has a mutability of "readOnly".

entitlements A list of entitlements for the user that represent a thing the user has. An entitlement MAY be an additional right to a thing, object, or service. No vocabulary or syntax is specified and service providers and clients are expected to encode sufficient information in the value so as to accurately and without ambiguity determine what the user has access to. This value has NO canonical types though type may be useful as a means to scope entitlements.

roles A list of roles for the user that collectively represent who the user is; e.g., "Student, Faculty". No vocabulary or syntax is specified though it is expected that a role value is a String or label representing a collection of entitlements. This value has NO canonical types.

x509Certificates A list of certificates issued to the User. Values are Binary (Section 2.1.6) and DER encoded x509. This value has NO canonical types.

6. SCIM Enterprise User Schema Extension

The following SCIM extension defines attributes commonly used in representing users that belong to, or act on behalf of a business or enterprise. The enterprise user extension is identified using the following schema URI: "urn:ietf:params:scim:schemas:extension:enterprise:2.0:User".

The following Singular Attributes are defined:

employeeNumber Numeric or alphanumeric identifier assigned to a person, typically based on order of hire or association with an organization.

costCenter Identifies the name of a cost center.

organization Identifies the name of an organization.

division Identifies the name of a division.

department Identifies the name of a department.

manager The user's manager. A complex type that optionally allows service providers to represent organizational hierarchy by referencing the "id" attribute of another User.

value The "id" of the SCIM resource representing the user's manager. RECOMMENDED.

$ref The URI of the SCIM resource representing the User's manager. RECOMMENDED.

displayName The displayName of the user's manager. This attribute is OPTIONAL and mutability is "readOnly".

7. SCIM Group Schema

SCIM provides a schema for representing groups, identified using the following schema URI: "urn:ietf:params:scim:schemas:core:2.0:Group".

Group resources are meant to enable expression of common group or role based access control models, although no explicit authorization model is defined. It is intended that the semantics of group membership and any behavior or authorization granted as a result of membership are defined by the service provider are considered out of scope for this specification.

The following singular attribute is defined in addition to the common attributes defined in SCIM core schema:

displayName A human readable name for the Group. REQUIRED.

The following multi-valued attribute is defined in addition to the common attributes defined in SCIM Core Schema:

members A list of members of the Group. While values MAY be added or removed, sub-attributes of members are "immutable". The "value" sub-attribute must be the "id" and the "$ref" sub-attribute must be the URI of a SCIM resource, either a "User", or a "Group". The intention of the "Group" type is to allow the service provider to support nested groups. Service providers MAY require clients to provide a non-empty members value based on the "required" sub attribute of the "members" attribute in the "Group" resource schema.

8. Service Provider Configuration Schema

SCIM provides a schema for representing the service provider's configuration identified using the following schema URI: "urn:ietf:params:scim:schemas:core:2.0:ServiceProviderConfig"

The service provider configuration resource enables a service provider to discovery of SCIM specification features in a standardized form as well as provide additional implementation details to clients. All attributes are READ-ONLY (a mutability of "readOnly"). Unlike other core resources, the "id" attribute is not required for the service provider configuration resource.

The following Singular Attributes are defined in addition to the common attributes defined in Core Schema:

documentationUrl An HTTP addressable URL pointing to the service provider's human consumable help documentation.

patch A complex type that specifies PATCH configuration options. REQUIRED.

supported Boolean value specifying whether the operation is supported. REQUIRED.

bulk A complex type that specifies BULK configuration options. REQUIRED

supported Boolean value specifying whether the operation is supported. REQUIRED.

maxOperations An integer value specifying the maximum number of operations. REQUIRED.

maxPayloadSize An integer value specifying the maximum payload size in bytes. REQUIRED.

filter A complex type that specifies FILTER options. REQUIRED.

supported Boolean value specifying whether the operation is supported. REQUIRED.

maxResults Integer value specifying the maximum number of resources returned in a response. REQUIRED.

changePassword A complex type that specifies Change Password configuration options. REQUIRED.

supported Boolean value specifying whether the operation is supported. REQUIRED.

sort A complex type that specifies Sort configuration options. REQUIRED.

supported Boolean value specifying whether sorting is supported. REQUIRED.

etag A complex type that specifies Etag configuration options. REQUIRED.

supported Boolean value specifying whether the operation is supported. REQUIRED.

The following multi-valued attribute is defined in addition to the common attributes defined in core schema:

authenticationSchemes A complex type that specifies supported Authentication Scheme properties. This attribute defines the following canonical values to represent common schemes: "oauth", "oauth2", "oauthbearertoken", "httpbasic", and "httpdigest". To enable seamless discovery of configuration, the service provider SHOULD, with the appropriate security considerations, make the authenticationSchemes attribute publicly accessible without prior authentication. REQUIRED.

name The common authentication scheme name; e.g., HTTP Basic. REQUIRED.

description A description of the Authentication Scheme. REQUIRED.

specUrl A HTTP addressable URL pointing to the Authentication Scheme's specification. OPTIONAL.

documentationUrl A HTTP addressable URL pointing to the Authentication Scheme's usage documentation. OPTIONAL.

9. ResourceType Schema

The "ResourceType" schema specifies the meta-data about a resource type. Resource type resources are READ-ONLY and identified using the following schema URI: "urn:ietf:params:scim:schemas:core:2.0:ResourceType". Unlike other core resources, all attributes are REQUIRED unless otherwise specified. The "id" attribute is not required for the resource type resource.

The following Singular Attributes are defined:

id The resource type's server unique id. Often this is the same value as the "name" attribute. OPTIONAL

name The resource type name. When applicable service providers MUST specify the name specified in the core schema specification; e.g., "User" or "Group". This name is referenced by the "meta.resourceType" attribute in all resources.

description The resource type's human readable description. When applicable service providers MUST specify the description specified in the core schema specification.

endpoint The resource type's HTTP addressable endpoint relative to the Base URL; e.g., "/Users".

schema The resource type's primary schema URI; e.g., "urn:ietf:params:scim:schemas:core:2.0:User". This MUST be equal to the "id" attribute of the associated "Schema" resource.

schemaExtensions A list of URIs of the resource type's schema extensions. OPTIONAL.

schema The URI of an extended schema; e.g., "urn:edu:2.0:Staff". This MUST be equal to the "id" attribute of a "Schema" resource. REQUIRED.

required A Boolean value that specifies whether the schema extension is required for the resource type. If true, a resource of this type MUST include this schema extension and include any attributes declared as required in this schema extension. If false, a resource of this type MAY omit this schema extension. REQUIRED.

10. Schema Schema

The "Schema" schema specifies the attribute(s) and meta-data that constitute a "Schema" resource. Schema resources have mutability of "readOnly" and identified using the following URI: "urn:ietf:params:scim:schemas:core:2.0:Schema". Unlike other core resources the "Schema" resource MAY contain a complex object within a sub-attribute and all attributes are REQUIRED unless otherwise specified.

The following Singular Attributes are defined:

id The unique URI of the schema. When applicable service providers MUST specify the URI specified in the core schema specification; e.g., "urn:ietf:params:scim:schemas:core:2.0:User". Unlike most other schemas, which use some sort of a GUID for the "id", the schema "id" is a URI so that it can be registered and is portable between different service providers and clients.

name The schema's human readable name. When applicable service providers MUST specify the name specified in the core schema specification; e.g., "User" or "Group". OPTIONAL.

description The schema's human readable description. When applicable service providers MUST specify the description specified in the core schema specification. OPTIONAL.

The following multi-valued attribute is defined:

attributes A complex type that specifies the set of resource attributes.

name The attribute's name.

type The attribute's data type; e.g., "String".

multiValued Boolean value indicating the attribute's plurality.

description The attribute's human readable description. When applicable service providers MUST specify the description specified in the core schema specification.

required A Boolean value that specifies if the attribute is required.

caseExact A Boolean value that specifies if the String attribute is case sensitive. The server SHALL use case sensitivity when evaluating filters. For attributes that are case exact, the server SHALL preserve case for any value submitted. If the attribute is case insensitive, the server MAY alter case for a submitted value.

mutability A single keyword indicating what types of modifications an attribute MAY accept as follows:

readOnly The attribute SHALL NOT be modified.

readWrite The attribute MAY be updated and read at any time. DEFAULT.

immutable The attribute MAY be defined at resource creation (e.g. POST) or at record replacement via request (e.g. a PUT). The attribute SHALL NOT be updated.

writeOnly The attribute MAY be updated at any time. Attribute values SHALL NOT be returned (e.g. because the value is a

stored hash). Note: an attribute with mutability of "writeOnly" usually also has a returned setting of "never".

returned A single keyword that indicates when an attribute and associated values are returned in response to a GET request or in response to a PUT, POST, or PATCH request. Valid keywords are:

always The attribute is always returned regardless of the contents of the "attributes" parameter. For example, "id" is always returned to identify a SCIM resource.

never The attribute is never returned. This may occur because the original attribute value is not retained by the service provider (e.g. such as with a hashed value). A service provider MAY allow attributes to be used in a search filter.

default The attribute is returned by default in all SCIM operation responses where attribute values are returned. If the GET request "attributes" parameter is specified, attribute values are only returned if the attribute is named in the attributes parameter. DEFAULT.

request The attribute is returned in response to any PUT, POST, or PATCH operations if the attribute was specified by the client (for example, the attribute was modified). The attribute is returned in a SCIM query operation only if specified in the "attributes" parameter.

uniqueness A single keyword value that specifies how the service provider enforces uniqueness of attribute values. A server MAY reject an invalid value based on uniqueness by returning HTTP Response code 400 (Bad Request). A client MAY enforce uniqueness on the client-side to a greater degree than the service provider enforces. For example, a client could make a value unique while the server has uniqueness of "none". Valid keywords are:

none The values are not intended to be unique in any way. DEFAULT.

server The value SHOULD be unique within the context of the current SCIM endpoint (or tenancy) but MAY not be globally unique (e.g. a "username", email address, or other server generated key or counter). No two resources on the same server SHOULD possess the same value.

global The value SHOULD be globally unique (e.g. an email address, a GUID, or other value). No two resources on any server SHOULD possess the same value.

referenceTypes The names of the resource types that may be referenced; e.g., "User". This is only applicable for attributes that are of the "reference" Section 2.1.7 data type.

The following multi-valued attributes are defined. There are no canonical type values defined and the primary value serves no useful purpose.

name The attribute's name.

type The attribute's data type; e.g., String.

description The attribute's human readable description. When applicable service providers MUST specify the description specified in the core schema specification.

required A Boolean value that specifies if the attribute is required.

caseExact A Boolean value that specifies if the String attribute is case sensitive.

referenceTypes The names of the resource types that may be referenced; e.g., User. This is only applicable for attributes that are of the "reference" Section 2.1.7 data type.

canonicalValues A collection of canonical values. When applicable service providers MUST specify the canonical types specified in the core schema specification; e.g., "work", "home". OPTIONAL.

mutability A single keyword indicating what types of modifications an attribute MAY accept as follows:

readOnly The attribute MAY NOT be modified.

readWrite The attribute MAY be updated and read at any time. DEFAULT.

immutable The attribute MAY be defined at resource creation (e.g. POST) or at record replacement via request (e.g. a PUT). The attribute MAY NOT be updated.

writeOnly The attribute MAY be updated at any time. Attribute values MAY NOT be returned (e.g. because the value is a stored hash). Note: an attribute with mutability of "writeOnly" usually also has a returned setting of "never".

returned A single keyword that indicates when an attribute and associated values are returned in response to a GET request or in response to a PUT, POST, or PATCH request. Valid keywords are:

always The attribute is always returned regardless of the contents of the "attributes" parameter. For example, "id" is always returned to identify a SCIM resource.

never The attribute is never returned. This may occur because the original attribute value is not retained by the service provider (e.g. such as with a hashed value). A service provider MAY allow attributes to be used in a search filter.

default The attribute is returned by default in all SCIM operation responses where attribute values are returned. If the GET request "attributes" parameter is specified, attribute values are only returned if the attribute is named in the attributes parameter. DEFAULT.

request The attribute is returned in response to any PUT, POST, or PATCH operations if the attribute was specified by the client (for example, the attribute was modified). The attribute is returned in a SCIM query operation only if specified in the "attributes" parameter.

uniqueness A single keyword value that specifies how the service provider enforces uniqueness of attribute values. A server MAY reject an invalid value based on uniqueness by returning HTTP Response code 400 (Bad Request). A client MAY enforce uniqueness on the client-side to a greater degree than the service provider enforces. For example, a client could make a value unique while the server has uniqueness of "none". Valid keywords are:

none The values are not intended to be unique in any way. DEFAULT.

server The value SHOULD be unique within the context of the current SCIM endpoint (or tenancy) but MAY not be globally unique (e.g. a "username", email address, or

other server generated key or counter). No two resources on the same server SHOULD possess the same value.

global The value SHOULD be globally unique (e.g. an email address, a GUID, or other value). No two resources on any server SHOULD possess the same value.

11. JSON Representation

11.1. Minimal User Representation

The following is a non-normative example of the minimal required SCIM representation in JSON format.

```
{
  "schemas": ["urn:ietf:params:scim:schemas:core:2.0:User"],
  "id": "2819c223-7f76-453a-919d-413861904646",
  "userName": "bjensen@example.com",
  "meta": {
    "resourceType": "User",
    "created": "2010-01-23T04:56:22Z",
    "lastModified": "2011-05-13T04:42:34Z",
    "version": "W\/\"3694e05e9dff590\"",
    "location": "https://example.com/v2/Users/
2819c223-7f76-453a-919d-413861904646"
  }
}
```

Figure 2: Example Minimal User JSON Representation

11.2. Full User Representation

The following is a non-normative example of the fully populated SCIM representation in JSON format.

```
{
  "schemas": ["urn:ietf:params:scim:schemas:core:2.0:User"],
  "id": "2819c223-7f76-453a-919d-413861904646",
  "externalId": "701984",
  "userName": "bjensen@example.com",
  "name": {
    "formatted": "Ms. Barbara J Jensen III",
    "familyName": "Jensen",
    "givenName": "Barbara",
    "middleName": "Jane",
    "honorificPrefix": "Ms.",
    "honorificSuffix": "III"
  },
  "displayName": "Babs Jensen",
```

```
  "nickName": "Babs",
  "profileUrl": "https://login.example.com/bjensen",
  "emails": [
    {
      "value": "bjensen@example.com",
      "type": "work",
      "primary": true
    },
    {
      "value": "babs@jensen.org",
      "type": "home"
    }
  ],
  "addresses": [
    {
      "type": "work",
      "streetAddress": "100 Universal City Plaza",
      "locality": "Hollywood",
      "region": "CA",
      "postalCode": "91608",
      "country": "USA",
      "formatted": "100 Universal City Plaza\nHollywood, CA 91608 USA",
      "primary": true
    },
    {
      "type": "home",
      "streetAddress": "456 Hollywood Blvd",
      "locality": "Hollywood",
      "region": "CA",
      "postalCode": "91608",
      "country": "USA",
      "formatted": "456 Hollywood Blvd\nHollywood, CA 91608 USA"
    }
  ],
  "phoneNumbers": [
    {
      "value": "555-555-5555",
      "type": "work"
    },
    {
      "value": "555-555-4444",
      "type": "mobile"
    }
  ],
  "ims": [
    {
      "value": "someaimhandle",
      "type": "aim"
```

```
    }
  ],
  "photos": [
    {
      "value": "https://photos.example.com/profilephoto/72930000000Ccne/F",
      "type": "photo"
    },
    {
      "value": "https://photos.example.com/profilephoto/72930000000Ccne/T",
      "type": "thumbnail"
    }
  ],
  "userType": "Employee",
  "title": "Tour Guide",
  "preferredLanguage":"en-US",
  "locale": "en-US",
  "timezone": "America/Los_Angeles",
  "active":true,
  "password":"t1meMa$heen",
  "groups": [
    {
      "value": "e9e30dba-f08f-4109-8486-d5c6a331660a",
      "$ref": "https://example.com/v2/Groups/e9e30dba-f08f-4109-8486-
d5c6a331660a",
      "display": "Tour Guides"
    },
    {
      "value": "fc348aa8-3835-40eb-a20b-c726e15c55b5",
      "$ref": "https://example.com/v2/Groups/fc348aa8-3835-40eb-a20b-
c726e15c55b5",
      "display": "Employees"
    },
    {
      "value": "71ddacd2-a8e7-49b8-a5db-ae50d0a5bfd7",
      "$ref": "https://example.com/v2/Groups/71ddacd2-a8e7-49b8-a5db-
ae50d0a5bfd7",
      "display": "US Employees"
    }
  ],
  "x509Certificates": [
    {
      "value":
"MIIDQzCCAqygAwIBAgICEAAwDQYJKoZIhvcNAQEFBQAwTjELMAkGA1UEBhMCVVMx

EzARBgNVBAgMCkNhbGlmb3JuaWExFDASBgNVBAoMC2V4YW1wbGUuY29tMRQwEgYD

VQQDDAtleGFtcGxlLmNvbTAeFw0xMTEwMjIwNjI0MzFaFw0xMjEwMDQwNjI0MzFa
```

```
MH8xCzAJBgNVBAYTAlVTMRMwEQYDVQQIDApDYWxpZm9ybmlhMRQwEgYDVQQKDAtl

eGFtcGxlLmNvbTEhMB8GA1UEAwwYTXMuIEJhcmJhcmEgSiBKZW5zZW4gSUlJMSIw

IAYJKoZIhvcNAQkBFhNiamVuc2VuQGV4YW1wbGUuY29tMIIBIjANBgkqhkiG9w0B
                AQEFAAOCAQ8AMIIBCgKCAQEA7Kr+Dcds/
JQ5GwejJFcBIP682X3xpjis56AK02bc
                1FLgzdLI8auoR+cC9/
Vrh5t66HkQIOdA4unHh0AaZ4xL5PhVbXIPMB5vAPKpzz5i

PSi8xO8SL7I7SDhcBVJhqVqr3HgllEG6UClDdHO7nkLuwXq8HcISKkbT5WFTVfFZ

zidPl8HZ7DhXkZIRtJwBweq4bvm3hM1Os7UQH05ZS6cVDgweKNwdLLrT51ikSQG3
```

```
DYrl+ft781UQRIqxgwqCfXEuDiinPh0kkvIi5jivVu1Z9QiwlYEdRbLJ4zJQBmDr
                SGTMYn4lRc2HgHO4DqB/
bnMVorHB0CC6AV1QoFK4GPe1LwIDAQABo3sweTAJBgNV

HRMEAjAAMCwGCWCGSAGG+EIBDQQfFh1PcGVuU1NMIEdlbmVyYXRlZCBDZXJ0aWZp
                Y2F0ZTAdBgNVHQ4EFgQU8pD0U0vsZIsaA16lL8En8bx0F/
gwHwYDVR0jBBgwFoAU

dGeKitcaF7gnzsNwDx708kqaVt0wDQYJKoZIhvcNAQEFBQADgYEAA81SsFnOdYJt
                Ng5Tcq+/
ByEDrBgnusx0jloUhByPMEVkoMZ3J7j1ZgI8rAbOkNngX8+pKfTiDz1R
                C4+dx8oU6Za+4NJXUjlL5CvV6BEYb1+QAEJwitTVvxB/A67g42/
vzgAtoRUeDov1
                +GFiBZ+GNF/cAYKcMtGcrs2i97ZkJMo="
    }
  ],
  "meta": {
    "resourceType": "User",
    "created": "2010-01-23T04:56:22Z",
    "lastModified": "2011-05-13T04:42:34Z",
    "version": "W\/\"a330bc54f0671c9\"",
    "location": "https://example.com/v2/Users/
2819c223-7f76-453a-919d-413861904646"
  }
}
```

Figure 3: Example Full User JSON Representation

11.3. Enterprise User Extension Representation

The following is a non-normative example of the fully populated User using the enterprise User extension in JSON format.

```
{
  "schemas":
    [ "urn:ietf:params:scim:schemas:core:2.0:User",
      "urn:ietf:params:scim:schemas:extension:enterprise:2.0:User"],
  "id": "2819c223-7f76-453a-919d-413861904646",
  "externalId": "701984",
  "userName": "bjensen@example.com",
  "name": {
    "formatted": "Ms. Barbara J Jensen III",
    "familyName": "Jensen",
    "givenName": "Barbara",
    "middleName": "Jane",
    "honorificPrefix": "Ms.",
    "honorificSuffix": "III"
```

```
  },
  "displayName": "Babs Jensen",
  "nickName": "Babs",
  "profileUrl": "https://login.example.com/bjensen",
  "emails": [
    {
      "value": "bjensen@example.com",
      "type": "work",
```

```
      "primary": true
    },
    {
      "value": "babs@jensen.org",
      "type": "home"
    }
  ],
  "addresses": [
    {
      "streetAddress": "100 Universal City Plaza",
      "locality": "Hollywood",
      "region": "CA",
      "postalCode": "91608",
      "country": "USA",
      "formatted": "100 Universal City Plaza\nHollywood, CA 91608 USA",
      "type": "work",
      "primary": true
    },
    {
      "streetAddress": "456 Hollywood Blvd",
      "locality": "Hollywood",
      "region": "CA",
      "postalCode": "91608",
      "country": "USA",
      "formatted": "456 Hollywood Blvd\nHollywood, CA 91608 USA",
      "type": "home"
     }
  ],
  "phoneNumbers": [
    {
      "value": "555-555-5555",
      "type": "work"
    },
    {
      "value": "555-555-4444",
      "type": "mobile"
    }
  ],
  "ims": [
    {
      "value": "someaimhandle",
      "type": "aim"
    }
  ],
  "photos": [
    {
      "value": "https://photos.example.com/profilephoto/72930000000Ccne/F",
      "type": "photo"
```

```
    },
    {
      "value": "https://photos.example.com/profilephoto/72930000000Ccne/T",
      "type": "thumbnail"
    }
  ],
  "userType": "Employee",
  "title": "Tour Guide",
  "preferredLanguage":"en-US",
  "locale": "en-US",
  "timezone": "America/Los_Angeles",
  "active":true,
  "password":"t1meMa$heen",
  "groups": [
    {
      "value": "e9e30dba-f08f-4109-8486-d5c6a331660a",
      "$ref": "/Groups/e9e30dba-f08f-4109-8486-d5c6a331660a",
      "display": "Tour Guides"
    },
    {
      "value": "fc348aa8-3835-40eb-a20b-c726e15c55b5",
      "$ref": "/Groups/fc348aa8-3835-40eb-a20b-c726e15c55b5",
      "display": "Employees"
    },
    {
      "value": "71ddacd2-a8e7-49b8-a5db-ae50d0a5bfd7",
      "$ref": "/Groups/71ddacd2-a8e7-49b8-a5db-ae50d0a5bfd7",
      "display": "US Employees"
    }
  ],
  "x509Certificates": [
    {
      "value":
"MIIDQzCCAqygAwIBAgICEAAwDQYJKoZIhvcNAQEFBQAwTjELMAkGA1UEBhMCVVMx

EzARBgNVBAgMCkNhbGlmb3JuaWExFDASBgNVBAoMC2V4YW1wbGUuY29tMRQwEgYD

VQQDDAtleGFtcGxlLmNvbTAeFw0xMTEwMjIwNjI0MzFaFw0xMjEwMDQwNjI0MzFa

MH8xCzAJBgNVBAYTAlVTMRMwEQYDVQQIDApDYWxpZm9ybmlhMRQwEgYDVQQKDAtl

eGFtcGxlLmNvbTEhMB8GA1UEAwwYTXMuIEJhcmJhcmEgSiBKZW5zZW4gSUlJMSIw

IAYJKoZIhvcNAQkBFhNiamVuc2VuQGV4YW1wbGUuY29tMIIBIjANBgkqhkiG9w0B
                AQEFAAOCAQ8AMIIBCgKCAQEA7Kr+Dcds/
JQ5GwejJFcBIP682X3xpjis56AK02bc
                1FLgzdLI8auoR+cC9/
Vrh5t66HkQIOdA4unHh0AaZ4xL5PhVbXIPMB5vAPKpzz5i
```

```
PSi8xO8SL7I7SDhcBVJhqVqr3HgllEG6UClDdHO7nkLuwXq8HcISKkbT5WFTVfFZ

zidPl8HZ7DhXkZIRtJwBweq4bvm3hM1Os7UQH05ZS6cVDgweKNwdLLrT51ikSQG3

DYrl+ft781UQRIqxgwqCfXEuDiinPh0kkvIi5jivVu1Z9QiwlYEdRbLJ4zJQBmDr
                SGTMYn4lRc2HgHO4DqB/
bnMVorHB0CC6AV1QoFK4GPe1LwIDAQABo3sweTAJBgNV

HRMEAjAAMCwGCWCGSAGG+EIBDQQfFh1PcGVuU1NMIEdlbmVyYXRlZCBDZXJ0aWZp
                Y2F0ZTAdBgNVHQ4EFgQU8pD0U0vsZIsaA16lL8En8bx0F/
gwHwYDVR0jBBgwFoAU

dGeKitcaF7gnzsNwDx708kqaVt0wDQYJKoZIhvcNAQEFBQADgYEAA81SsFnOdYJt
                Ng5Tcq+/
ByEDrBgnusx0jloUhByPMEVkoMZ3J7j1ZgI8rAbOkNngX8+pKfTiDz1R
```

```
                C4+dx8oU6Za+4NJXUjlL5CvV6BEYb1+QAEJwitTVvxB/A67g42/
vzgAtoRUeDov1
                +GFiBZ+GNF/cAYKcMtGcrs2i97ZkJMo="
    }
  ],
  "urn:ietf:params:scim:schemas:extension:enterprise:2.0:User": {
    "employeeNumber": "701984",
    "costCenter": "4130",
    "organization": "Universal Studios",
    "division": "Theme Park",
    "department": "Tour Operations",
    "manager": {
      "managerId": "26118915-6090-4610-87e4-49d8ca9f808d",
      "$ref": "/Users/26118915-6090-4610-87e4-49d8ca9f808d",
      "displayName": "John Smith"
    }
  },
  "meta": {
    "resourceType": "User",
    "created": "2010-01-23T04:56:22Z",
    "lastModified": "2011-05-13T04:42:34Z",
    "version": "W\/\"3694e05e9dff591\"",
    "location": "https://example.com/v2/Users/
2819c223-7f76-453a-919d-413861904646"
  }
}
```

Figure 4: Example Enterprise User JSON Representation

11.4. Group Representation

The following is a non-normative example of SCIM Group representation in JSON format.

```
{
  "schemas": ["urn:ietf:params:scim:schemas:core:2.0:Group"],
  "id": "e9e30dba-f08f-4109-8486-d5c6a331660a",
  "displayName": "Tour Guides",
  "members": [
    {
      "value": "2819c223-7f76-453a-919d-413861904646",
      "$ref": "https://example.com/v2/Users/
2819c223-7f76-453a-919d-413861904646",
      "display": "Babs Jensen"
    },
    {
      "value": "902c246b-6245-4190-8e05-00816be7344a",
      "$ref": "https://example.com/v2/Users/
902c246b-6245-4190-8e05-00816be7344a",
      "display": "Mandy Pepperidge"
    }
  ],
  "meta": {
    "resourceType": "Group",
    "created": "2010-01-23T04:56:22Z",
    "lastModified": "2011-05-13T04:42:34Z",
    "version": "W\/\"3694e05e9dff592\"",
    "location": "https://example.com/v2/Groups/e9e30dba-f08f-4109-8486-
d5c6a331660a"
  }
}
```


Figure 5: Example Group JSON Representation

11.5. Service Provider Configuration Representation

The following is a non-normative example of the SCIM service provider configuration representation in JSON format.


```
{
  "schemas": ["urn:ietf:params:scim:schemas:core:2.0:ServiceProviderConfig"],
  "documentationUrl":"http://example.com/help/scim.html",
  "patch": {
    "supported":true
  },
  "bulk": {
    "supported":true,
    "maxOperations":1000,
    "maxPayloadSize":1048576
  },
  "filter": {
    "supported":true,
```

```
    "maxResults": 200
  },
  "changePassword" : {
```

```
    "supported":true
  },
  "sort": {
    "supported":true
  },
  "etag": {
    "supported":true
  },
  "authenticationSchemes": [
    {
      "name": "OAuth Bearer Token",
      "description": "Authentication Scheme using the OAuth Bearer Token
Standard",
      "specUrl":"http://tools.ietf.org/html/draft-ietf-oauth-v2-bearer-01",
      "documentationUrl":"http://example.com/help/oauth.html",
      "type":"oauthbearertoken",
      "primary": true
    },
    {
      "name": "HTTP Basic",
      "description": "Authentication Scheme using the Http Basic Standard",
      "specUrl":"http://www.ietf.org/rfc/rfc2617.txt",
      "documentationUrl":"http://example.com/help/httpBasic.html",
      "type":"httpbasic"
     }
  ],
  "meta": {
    "location":"https://example.com/v2/ServiceProviderConfig",
    "resourceType": "ServiceProviderConfig",
    "created": "2010-01-23T04:56:22Z",
    "lastModified": "2011-05-13T04:42:34Z",
    "version": "W\/\"3694e05e9dff594\""
  }
}
```

Figure 6: Example Service Provider Config JSON Representation

11.6. Resource Type Representation

The following is a non-normative example of the SCIM resource type representation in JSON format.

```
{
  "schemas": ["urn:ietf:params:scim:schemas:core:2.0:ResourceType"],
  "id":"User",
  "name":"User",
  "endpoint": "/Users",
  "description": "Core User",
  "schema": "urn:ietf:params:scim:schemas:core:2.0:User",
  "schemaExtensions": [
    {
      "schema": "urn:ietf:params:scim:schemas:extension:enterprise:2.0:User",
      "required": true
    }
  ],
  "meta": {
    "location":"https://example.com/v2/ResourceTypes/User",
    "resourceType": "ResourceType",
    "created": "2010-01-23T04:56:22Z",
    "lastModified": "2011-05-13T04:42:34Z",
    "version": "W\/\"3694e05e9dff595\""
  }
}
```

Figure 7: Example Resource Type JSON Representation

11.7. Schema Representation

The following is intended as normative example of the SCIM Schema representation in JSON format. Where permitted individual values and schema MAY change. Included but not limited to, are schemas for User, Group, and enterprise user.

```
{[
  {
    "id" : "urn:ietf:params:scim:schemas:core:2.0:User",
    "name" : "User",
    "description" : "Core User",
    "attributes" : [
      {
        "name" : "id",
        "type" : "string",
        "multiValued" : false,
        "description" : "Unique identifier for the SCIM resource as defined by
the Service Provider. Each representation of the resource MUST include a non-
empty id value. This identifier MUST be unique across the Service Provider's
entire set of resources. It MUST be a stable, non-reassignable identifier that
does not change when the same resource is returned in subsequent requests. The
value of the id attribute is always issued by the Service Provider and MUST
never be specified by the Service Consumer. REQUIRED.",
```

```
        "required" : true,
        "caseExact" : false,
        "mutability" : "readOnly",
        "returned" : "always",
        "uniqueness" : "server"
      },
```

```
      {
        "name" : "externalId",
        "type" : "string",
        "multiValued" : false,
        "description" : "An identifier for the Resource as defined by the
Service Consumer.",
        "required" : true,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "userName",
        "type" : "string",
        "multiValued" : false,
        "description" : "Unique identifier for the User typically used by the
user to directly authenticate to the service provider. Each User MUST include a
non-empty userName value.  This identifier MUST be unique across the Service
Consumer's entire set of Users.  REQUIRED",
        "required" : true,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "server"
      },
      {
        "name" : "name",
        "type" : "complex",
        "multiValued" : false,
        "description" : "The components of the user's real name. Providers MAY
return just the full name as a single string in the formatted sub-attribute, or
they MAY return just the individual component attributes using the other sub-
attributes, or they MAY return both. If both variants are returned, they SHOULD
be describing the same name, with the formatted name indicating how the
component attributes should be combined.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "formatted",
            "type" : "string",
            "multiValued" : false,
            "description" : "The full name, including all middle names, titles,
and suffixes as appropriate, formatted for display (e.g. Ms. Barbara J Jensen,
III.).",
            "required" : false,
            "caseExact" : false,
```

```
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "familyName",
            "type" : "string",
            "multiValued" : false,
            "description" : "The family name of the User, or Last Name in most
Western languages (e.g. Jensen given the full name Ms. Barbara J Jensen,
III.).",
            "required" : false,
            "caseExact" : false,
```

```
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "givenName",
            "type" : "string",
            "multiValued" : false,
            "description" : "The given name of the User, or First Name in most
Western languages (e.g. Barbara given the full name Ms. Barbara J Jensen,
III.).",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "middleName",
            "type" : "string",
            "multiValued" : false,
            "description" : "The middle name(s) of the User (e.g. Robert given
the full name Ms. Barbara J Jensen, III.).",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "honorificPrefix",
            "type" : "string",
            "multiValued" : false,
            "description" : "The honorific prefix(es) of the User, or Title in
most Western languages (e.g. Ms. given the full name Ms. Barbara J Jensen,
III.).",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "honorificSuffix",
            "type" : "string",
            "multiValued" : false,
            "description" : "The honorific suffix(es) of the User, or Suffix in
most Western languages (e.g. III. given the full name Ms. Barbara J Jensen,
```

```
III.).",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
```

```
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "displayName",
        "type" : "string",
        "multiValued" : false,
        "description" : "The name of the User, suitable for display to end-
users. The name SHOULD be the full name of the User being described if known",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "nickName",
        "type" : "string",
        "multiValued" : false,
        "description" : "The casual way to address the user in real life, e.g.
\"Bob\" or \"Bobby\" instead of \"Robert\".  This attribute SHOULD NOT be used
to represent a User's username (e.g. bjensen or mpepperidge)",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "profileUrl",
        "type" : "string",
        "multiValued" : false,
        "description" : "A fully qualified URL to a page representing the
User's online profile",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "title",
        "type" : "string",
        "multiValued" : false,
        "description" : "The user's title, such as \"Vice President.\"",
        "required" : false,
```

```
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
```

```
      },
      {
        "name" : "userType",
        "type" : "string",
        "multiValued" : false,
        "description" : "Used to identify the organization to user
relationship. Typical values used might be \"Contractor\", \"Employee\",
\"Intern\", \"Temp\", \"External\", and \"Unknown\" but any value may be used
",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "preferredLanguage",
        "type" : "string",
        "multiValued" : false,
        "description" : "Indicates the User's preferred written or spoken
language.  Generally used for selecting a localized User interface. e.g.,
'en_US' specifies the language English and country US.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "locale",
        "type" : "string",
        "multiValued" : false,
        "description" : "Used to indicate the User's default location for
purposes of localizing items such as currency, date time format, numerical
representations, etc.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "timezone",
        "type" : "string",
        "multiValued" : false,
        "description" : "The User's time zone in the \"Olson\" timezone
database format [19]; e.g.,'America/Los_Angeles'",
        "required" : false,
```

```
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "active",
        "type" : "boolean",
```

```
        "multiValued" : false,
        "description" : "A Boolean value indicating the User's administrative
status.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "password",
        "type" : "string",
        "multiValued" : false,
        "description" : "The User's clear text password.  This attribute is
intended to be used as a means to specify an initial password when creating a
new User or to reset an existing User's password.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "writeOnly",
        "returned" : "never",
        "uniqueness" : "none"
      },
      {
        "name" : "emails",
        "type" : "complex",
        "multiValued" : true,
        "description" : "E-mail addresses for the user. The value SHOULD be
canonicalized by the Service Provider, e.g. bjensen@example.com instead of
bjensen@EXAMPLE.COM. Canonical Type values of work, home, and other.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "E-mail addresses for the user. The value SHOULD be
canonicalized by the Service Provider, e.g. bjensen@example.com instead of
bjensen@EXAMPLE.COM. Canonical Type values of work, home, and other.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
```

```
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
```

```
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function; e.g.,
'work' or 'home'.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "work",
              "home",
              "other"
            ],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
            "type" : "boolean",
            "multiValued" : false,
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute, e.g. the preferred mailing
address or primary e-mail address. The primary attribute value 'true' MUST
appear no more than once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "phoneNumbers",
        "type" : "complex",
        "multiValued" : true,
        "description" : "Phone numbers for the User.  The value SHOULD be
canonicalized by the Service Provider according to format in RFC3966 [20] e.g.
'tel:+1-201-555-0123'.  Canonical Type values of work, home, mobile, fax, pager
and other.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
```

```
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "Phone number of the User",
            "required" : false,
            "caseExact" : false,
```

```
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function; e.g.,
'work' or 'home' or 'mobile' etc.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "work",
              "home",
              "mobile",
              "fax",
              "pager",
              "other"
            ],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
            "type" : "boolean",
            "multiValued" : false,
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute, e.g. the preferred phone number
or primary phone number. The primary attribute value 'true' MUST appear no more
than once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
```

```
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
```

```
        "uniqueness" : "none"
      },
      {
        "name" : "ims",
        "type" : "complex",
        "multiValued" : true,
        "description" : "Instant messaging addresses for the User.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "Instant messaging address for the User.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function; e.g.,
'aim', 'gtalk', 'mobile' etc.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "aim",
              "gtalk",
              "icq",
              "xmpp",
              "msn",
              "skype",
```

```
            "qq",
            "yahoo"
```

```
            ],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
            "type" : "boolean",
            "multiValued" : false,
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute, e.g. the preferred messenger or
primary messenger. The primary attribute value 'true' MUST appear no more than
once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "photos",
        "type" : "complex",
        "multiValued" : true,
        "description" : "URLs of photos of the User.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "URL of a photo of the User.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
```

```
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
```

```
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function; e.g.,
'photo' or 'thumbnail'.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "photo",
              "thumbnail"
            ],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
            "type" : "boolean",
            "multiValued" : false,
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute, e.g. the preferred photo or
thumbnail. The primary attribute value 'true' MUST appear no more than once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "addresses",
        "type" : "complex",
        "multiValued" : true,
        "description" : "A physical mailing address for this User, as described
in (address Element). Canonical Type Values of work, home, and other. The value
attribute is a complex type with the following sub-attributes.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
```

```
            "name" : "formatted",
            "type" : "string",
            "multiValued" : false,
            "description" : "The full mailing address, formatted for display or
use with a mailing label. This attribute MAY contain newlines.",
            "required" : false,
```

```
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "streetAddress",
            "type" : "string",
            "multiValued" : false,
            "description" : "The full street address component, which may
include house number, street name, PO BOX, and multi-line extended street
address information. This attribute MAY contain newlines.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "locality",
            "type" : "string",
            "multiValued" : false,
            "description" : "The city or locality component.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "region",
            "type" : "string",
            "multiValued" : false,
            "description" : "The state or region component.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "postalCode",
            "type" : "string",
            "multiValued" : false,
            "description" : "The zipcode or postal code component.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
```

```
            "returned" : "default",
            "uniqueness" : "none"
```

```
          },
          {
            "name" : "country",
            "type" : "string",
            "multiValued" : false,
            "description" : "The country name component.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function; e.g.,
'work' or 'home'.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "work",
              "home",
              "other"
            ],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "groups",
        "type" : "complex",
        "multiValued" : true,
        "description" : "A list of groups that the user belongs to, either
thorough direct membership, nested groups, or dynamically calculated",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "The identifier of the User's group.",
```

```
            "readOnly" : false,
            "required" : false,
```

```
            "caseExact" : false,
            "mutability" : "readOnly",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "$ref",
            "type" : "string",
            "multiValued" : false,
            "description" : "The URI of the corresponding Group resource to
which the user belongs",
            "readOnly" : false,
            "required" : false,
            "caseExact" : false,
            "mutability" : "readOnly",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
purposes. READ-ONLY.",
            "readOnly" : true,
            "required" : false,
            "caseExact" : false,
            "mutability" : "readOnly",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function; e.g.,
'direct' or 'indirect'.",
            "readOnly" : false,
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "direct",
              "indirect"
            ],
            "mutability" : "readOnly",
            "returned" : "default",
            "uniqueness" : "none"
          }
```

```
        ],
        "mutability" : "readOnly",
        "returned" : "default",
```

```
        "uniqueness" : "none"
      },
      {
        "name" : "entitlements",
        "type" : "complex",
        "multiValued" : true,
        "description" : "A list of entitlements for the User that represent a
thing the User has.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "The value of an entitlement.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
```

```
            "type" : "boolean",
            "multiValued" : false,
```

```
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute. The primary attribute value
'true' MUST appear no more than once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "roles",
        "type" : "complex",
        "multiValued" : true,
        "description" : "A list of roles for the User that collectively
represent who the User is; e.g., 'Student', 'Faculty'.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "The value of a role.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
```

```
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function.",
            "required" : false,
```

```
            "caseExact" : false,
            "canonicalValues" : [],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
            "type" : "boolean",
            "multiValued" : false,
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute. The primary attribute value
'true' MUST appear no more than once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "x509Certificates",
        "type" : "complex",
        "multiValued" : true,
        "description" : "A list of certificates issued to the User.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
            "type" : "string",
            "multiValued" : false,
            "description" : "The value of a X509 certificate.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "display",
            "type" : "string",
            "multiValued" : false,
            "description" : "A human readable name, primarily used for display
```

```
purposes. READ-ONLY.",
            "required" : false,
            "caseExact" : false,
```

```
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the attribute's function.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [],
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "primary",
            "type" : "boolean",
            "multiValued" : false,
            "description" : "A Boolean value indicating the 'primary' or
preferred attribute value for this attribute. The primary attribute value
'true' MUST appear no more than once.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      }
    ],
    "meta" : {
      "resourceType" : "Schema",
      "created" : "2010-01-23T04:56:22Z",
      "lastModified" : "2014-02-04T00:00:00Z",
      "version" : "W/\"3694e05e9dff596\"",
      "location" : "https://example.com/v2/Schemas/
urn:ietf:params:scim:schemas:core:2.0:User"
    }
  },
  {
    "id" : "urn:ietf:params:scim:schemas:core:2.0:Group",
    "name" : "Group",
    "description" : "Core Group",
```

```
    "attributes" : [
      {
        "name" : "id",
```

```
        "type" : "string",
        "multiValued" : false,
        "description" : "Unique identifier for the SCIM resource as defined by
the Service Provider. Each representation of the resource MUST include a non-
empty id value. This identifier MUST be unique across the Service Provider's
entire set of resources. It MUST be a stable, non-reassignable identifier that
does not change when the same resource is returned in subsequent requests. The
value of the id attribute is always issued by the Service Provider and MUST
never be specified by the Service Consumer. REQUIRED.",
        "required" : true,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "always",
        "uniqueness" : "server"
      },
      {
        "name" : "externalId",
        "type" : "string",
        "multiValued" : false,
        "description" : "An identifier for the Resource as defined by the
Service Consumer.",
        "required" : true,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "displayName",
        "type" : "string",
        "multiValued" : false,
        "description" : "A human readable name for the Group.  REQUIRED.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "members",
        "type" : "complex",
        "multiValued" : false,
        "description" : "A list of members of the Group.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "value",
```

```
            "type" : "string",
            "multiValued" : false,
            "description" : "The identifier of the member of this Group.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "immutable",
            "returned" : "default",
```

```
            "uniqueness" : "none"
          },
          {
            "name" : "$ref",
            "type" : "string",
            "multiValued" : false,
            "description" : "The URI of the corresponding to the member
resource of this Group.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "immutable",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "type",
            "type" : "string",
            "multiValued" : false,
            "description" : "A label indicating the type of resource; e.g.,
'User' or 'Group'.",
            "required" : false,
            "caseExact" : false,
            "canonicalValues" : [
              "User",
              "Group"
            ],
            "mutability" : "immutable",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      }
    ],
    "meta" : {
      "resourceType" : "Schema",
      "created" : "2010-01-23T04:56:22Z",
      "lastModified" : "2014-02-04T00:00:00Z",
      "version" : "W/\"3694e05e9dff596\"",
      "location" : "https://example.com/v2/Schemas/
urn:ietf:params:scim:schemas:core:2.0:Group"
    }
  },
  {
    "id" : "urn:ietf:params:scim:schemas:extension:enterprise:2.0:User",
    "name" : "EnterpriseUser",
```

```
    "description" : "Enterprise User",
    "attributes" : [
      {
```

```
        "name" : "employeeNumber",
        "type" : "string",
        "multiValued" : false,
        "description" : "Numeric or alphanumeric identifier assigned to a
person, typically based on order of hire or association with an organization.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "costCenter",
        "type" : "string",
        "multiValued" : false,
        "description" : "Identifies the name of a cost center.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "organization",
        "type" : "string",
        "multiValued" : false,
        "description" : "Identifies the name of an organization.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "division",
        "type" : "string",
        "multiValued" : false,
        "description" : "Identifies the name of a division.",
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "department",
        "type" : "string",
        "multiValued" : false,
```

```
        "description" : "Identifies the name of a department.",
```

```
        "required" : false,
        "caseExact" : false,
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      },
      {
        "name" : "manager",
        "type" : "complex",
        "multiValued" : false,
        "description" : "The User's manager. A complex type that optionally
allows Service Providers to represent organizational hierarchy by referencing
the \"id\" attribute of another User.",
        "required" : false,
        "caseExact" : false,
        "subAttributes" : [
          {
            "name" : "managerId",
            "type" : "string",
            "multiValued" : false,
            "description" : "The id of the SCIM resource representing the
User's  manager.  REQUIRED.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "$ref",
            "type" : "string",
            "multiValued" : false,
            "description" : "The URI of the SCIM resource representing the
User's manager.  REQUIRED.",
            "required" : false,
            "caseExact" : false,
            "mutability" : "readWrite",
            "returned" : "default",
            "uniqueness" : "none"
          },
          {
            "name" : "displayName",
            "type" : "string",
            "multiValued" : false,
            "description" : "The displayName of the User's manager.  OPTIONAL
and READ-ONLY.",
            "required" : false,
            "caseExact" : false,
```

```
            "mutability" : "readOnly",
            "returned" : "default",
            "uniqueness" : "none"
          }
        ],
```

```
        "mutability" : "readWrite",
        "returned" : "default",
        "uniqueness" : "none"
      }
    ],
    "meta" : {
      "resourceType" : "Schema",
      "created" : "2010-01-23T04:56:22Z",
      "lastModified" : "2014-02-04T00:00:00Z",
      "version" : "W/\"3694e05e9dff596\"",
      "location" : "https://example.com/v2/Schemas/
urn:ietf:params:scim:schemas:extension:enterprise:2.0:User"
    }
  }
]}
```

Figure 8: Eample Schema JSON Representation

12. Security Considerations

The SCIM Core schema contains personally identifiable information as well as other sensitive data. Aside from prohibiting password values in a SCIM response this specification does not provide any means or guarantee of confidentiality.

13. IANA Considerations

13.1. New Registration of SCIM URN Sub-namespace

IANA has created a registry for new IETF URN sub-namespaces, "urn:ietf:params:scim:", per [RFC3553]. The registration request is as follows:

Per [RFC3553], IANA has registered a new URN sub-namespace, "urn:ietf:params:scim".

- Registry name: scim
- Specification: [this document]
- Repository: [see Section 13.2]
- Index value: values [see Section 13.2]

13.2. URN Sub-Namespace for SCIM

SCIM schemas and SCIM messages utilize URIs to identify the schema in use or other relevant context. This section creates and registers an

IETF URN Sub-namespace for use in the SCIM specifications and future extensions.

13.2.1. Specification Template

Namespace ID:

The Namespace ID "scim" is requested.

Registration Information:

Version: 1

Date: [[insert final submission date]]

Declared registrant of the namespace:

Registering organization
The Internet Engineering Task Force

Designated contact
A designated expert will monitor the SCIM public mailing list, "scim@ietf.org".

Declaration of Syntactic Structure:

The Namespace Specific String (NSS) of all URNs that use the "scim" NID shall have the following structure:

urn:ietf:params:scim:{type}:{name}{:sName}:{vers}{:class}{:resType}

The keywords have the following meaning:

type
The entity type which is either "schemas" or "api".

name
A required US-ASCII string that conforms to the URN syntax requirements (see [RFC2141]) and defines a major namespace of object used within SCIM (e.g. "core", "extension"). The name "extension" MAY be used when the registered schema it refers to is intended to be used as an extension to another schema.

An optional US-ASCII string that conforms to the URN syntax requirements (see [RFC2141]) and defines a sub-class of object used within SCIM (e.g. "enterprise").

vers
The first SCIM protocol version number where the URN is valid (e.g. "2.0").

class
An optional US-ASCII string that conforms to the URN syntax requirements (see [RFC2141]) and defines a major class of object used within SCIM.

resType
An optional US-ASCII string that conforms to the URN syntax requirements (see [RFC2141]) and typically is used when referring to a resource type within SCIM (e.g. User).

Relevant Ancillary Documentation:

None

Identifier Uniqueness Considerations:

The designated contact shall be responsible for reviewing and enforcing uniqueness.

Identifier Persistence Considerations:

Once a name has been allocated it MUST NOT be re-allocated for a different purpose. The rules provided for assignments of values within a sub-namespace MUST be constructed so that the meaning of values cannot change. This registration mechanism is not appropriate for naming values whose meaning may change over time.

As the SCIM specifications are updated and the SCIM protocol version is adjusted, a new registration will be made when significant changes are made. Example, "urn:ietf:params:scim:schemas:core:1.0 (externally defined, not previously registered)" and "urn:ietf:params:scim:schemas:core:2.0".

Process of Identifier Assignment:

Identifiers with namespace type "schema" (e.g. "urn:ietf:params:scim:schemas") are assigned after the review of the assigned contact via the SCIM public mailing list, "scim@ietf.org" as documented in Section 13.3.

Namespaces with type "api" (e.g. "urn:ietf:params:scim:api") are reserved for IETF approved SCIM specifications. Namespaces with type "param" are reserved for future use.

Process of Identifier Resolution:

The namespace is not currently listed with a Resolution Discovery System (RDS), but nothing about the namespace prohibits the future definition of appropriate resolution methods or listing with an RDS.

Rules for Lexical Equivalence:

No special considerations; the rules for lexical equivalence specified in [RFC2141] apply.

Conformance with URN Syntax:

No special considerations.

Validation Mechanism:

None specified.

Scope:

Global.

13.2.2. Pre-Registered SCIM Schema Identifiers

The following SCIM Identifiers are defined:

urn:ietf:params:scim:schemas:core:2.0

SCIM Core Schema as specified in Section 4 and Section 13.4.

urn:ietf:params:scim:schemas:extension:enterprise:2.0

Enterprise schema extensions as defined in Section 6 and Section 13.4.

13.3. Registering SCIM Schemas

This section defines the process for registering new SCIM schemas with IANA. A schema URI is used as a value in the schemas attribute (Section 4.2) for the purpose of distinguishing extensions used in a SCIM resource.

13.3.1. Registration Procedure

The IETF has created a mailing list, scim@ietf.org, which can be used for public discussion of SCIM schema proposals prior to registration. Use of the mailing list is strongly encouraged. The IESG has appointed a designated expert who will monitor the scim@ietf.org mailing list and review registrations.

Registration of new schemas MUST be reviewed by the designated expert and published in an RFC. A Standards Track RFC is REQUIRED for the registration of new value data types that modify existing properties. A Standards Track RFC is also REQUIRED for registration of SCIM schema URIs that modify SCIM schema previously documented in a Standards Track RFC.

The registration procedure begins when a completed registration template, defined in the sections below, is sent to scim@ietf.org and iana@iana.org. Within two weeks, the designated expert is expected to tell IANA and the submitter of the registration whether the registration is approved, approved with minor changes, or rejected with cause. When a registration is rejected with cause, it can be re-submitted if the concerns listed in the cause are addressed. Decisions made by the designated expert can be appealed to the IESG Applications Area Director, then to the IESG. They follow the normal appeals procedure for IESG decisions.

Once the registration procedure concludes successfully, IANA creates or modifies the corresponding record in the SCIM schema registry. The completed registration template is discarded.

An RFC specifying new schema URI MUST include the completed registration templates, which MAY be expanded with additional information. These completed templates are intended to go in the body of the document, not in the IANA Considerations section. The RFC SHOULD include any attributes defined.

13.3.2. Schema Registration Template

A SCIM schema URI is defined by completing the following template:

Schema URI: Schema URI: A unique URI for the SCIM schema extension.

Schema Name: A descriptive name of the schema extension (e.g. Generic Device)

Intended or Associated Resource Type: A value defining the resource type (e.g. "Device").

Purpose: A description of the purpose of the extension and/or its intended use.

Single-value Attributes: A list and description of single-valued attributes defined including complex attributes.

Multi-valued Attributes: A list and description of multi-valued attributes defined including complex attributes.

13.4. Initial SCIM Schema Registry

The IANA has created and will maintain the following registries for SCIM schema URIs with pointers to appropriate reference documents.

Schema URI	Name	Reference
urn:ietf:params:scim:schemas:core:2.0:User	User Resource	See Section 5
urn:ietf:params:scim:schemas:extension:enterprise:2.0:User	Enterprise User Extension	See Section 6
urn:ietf:params:scim:schemas:core:2.0:Group	Group Resource	See Section 7

SCIM Schema URIs for Data Resources

Schema URI	Name	Reference
urn:ietf:params:scim:schemas:core:2.0:ServiceProviderConfig	Service Provider Configuration Schema	See Section 8
urn:ietf:params:scim:schemas:core:2.0:ResourceType	Resource Type Config	See Section 9
urn:ietf:params:scim:schemas:core:2.0:Schema	Schema Definitions Schema	See Section 10

SCIM Server Related Schema URIs

14. References

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Appendix A. Acknowledgements

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Appendix B. Change Log

[[This section to be removed prior to publication as an RFC]]

Draft 02 - KG - Addition of schema extensibility

Draft 03 - PH - Revisions based on following tickets:

09 - Attribute uniquenes

10 - Returnability of attributes

35 - Attribute mutability (replaces readOnly)

52 - Minor textual changes

53 - Standard use of term client (some was consumer)

56 - Make manager attribute consistent with other $ref attrs

58 - Add optional id to ResourceType objects for consistency

59 - Fix capitalization per IETF editor practices

60 - Changed <eref> tags to normal <xref> and <reference> tags

Draft 04 - PH - Revisions based on the following tickets:

43 - Drop short-hand notation for complex multi-valued attributes

61 - Specify attribute name limitations

62 - Fix 'mutability' normative language

63 - Fix incorrect EnterpriseUser schema reference

68 - Update JSON references from RFC4627 to RFC7159

71 - Made corrections to language tags in compliance with BCP47 / RFC5646

Draft 05 - PH - Revisions based on the following tickets

23 - Clarified that the server is not required to preserve case for case insensitive strings

41 - Add IANA considerations

72 - Added text to indicate UTF-8 is default and mandatory encoding format per BCP18

- Typo corrections and removed some redundant text

Draft 06 - PH - Revisions based on the following tickets

63 - Corrected enterprise user URI in 14.2 and section 7, URI namespace changes due to ticket #41

66 - Updated reference to final HTTP/1.1 drafts (RFC 7230)

41 - Add IANA considerations

- Removed redundant text (e.g. SAML binding, replaced REST with HTTP)

- Reordered introduction, definitions and notation sections to follow typical format

- meta.attributes removed due to new PURGE command in draft 04 (no longer used)

Draft 07 - PH - Edits and revisions

- Dropped use of the term API in favour of HTTP protocol or just protocol.

- Clarified meaning of null and unassigned

Draft 08 - PH - Revised IANA namespace to urn:ietf:params:scim per RFC3553

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