Service Description Conceptual Model (SDCM) Extension for REST-style Web Services

Version 1.0
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1 Introduction

1.1 Background

The Service Description Conceptual Model (SDCM) [SDCM] is a collaborative effort of the U.S. Federal Aviation Administration (FAA) System Wide Information Management Program (SWIM) and the Single European Sky Air Traffic Management (ATM) Research Programme (SESAR) Joint Undertaking (SJU). It defines a conceptual model of a Service Description based on the consistent application of Service-Oriented Architecture (SOA) principles and establishes consistent semantics for concepts used in documentation for SOA-based services.

Since the publication of SDCM 2.0 in June 2016, the aviation community has increasingly adopted Representational State Transfer (REST) [REST] as an architectural style for implementing SOA services. The SDCM Extension for REST-style Web Services (SDCM REST Extension), presented in this document, addresses the need to describe REST-style services by defining new modeling elements while maintaining compatibility with SDCM 2.0.

1.2 Relationship with SDCM 2.0

A Service Description is comprised of three main classes: Profile, Model, and Grounding. The SDCM REST Extension extends SDCM 2.0 by introducing several new classes under Model to support the definition of REST-style Web services. These classes describe Resources and their Representations. Classes included in this extension are listed in Section 3. Descriptions of services based on this extension MUST conform to SDCM 2.0.

This document uses the same Terminologies and Diagrammatic Symbolism as described in SDCM 2.0.

2 SDCM REST Extension

A diagram of the SDCM REST Extension classes that are described in this document is shown in Figure 1. A diagram of the complete SDCM Model class structure with the SDCM REST Extension is shown in Figure 2.

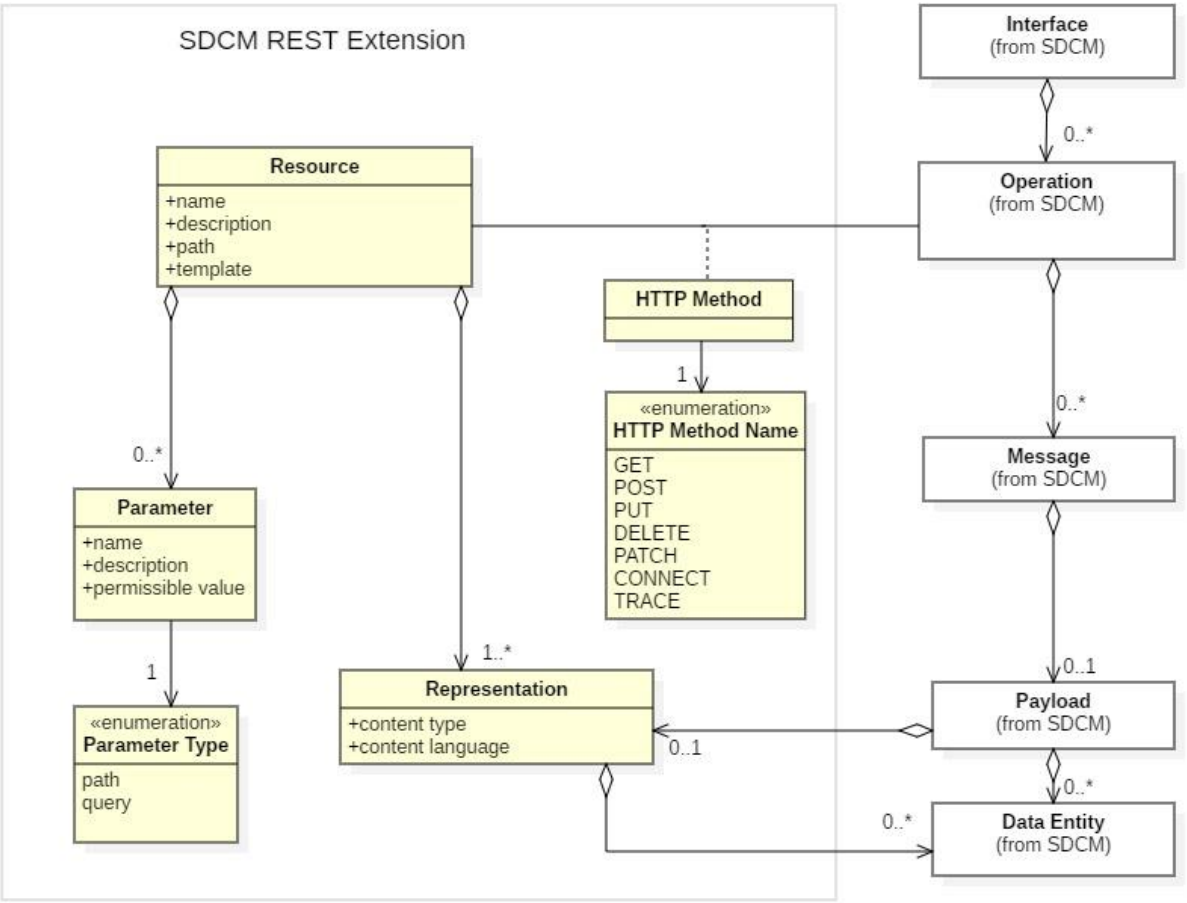

Figure 1 SDCM REST Extension

3 Concepts

3.1 Resource

Definition An item of interest a consumer can interact with through the service [WEB-ARCH].

Notes A resource is identified by a Uniform Resource Identifier (URI) [URI] and accessed through an Operation.

Table 3.1-1 Resource Attributes

Name	***Definition***	***Notes***
name	The name of the resource.	Example: `flightId`
description	A description of the resource.	
path	A relative path to the URI that identifies the resource in the context of the API.	Example: `/flight/status/flightId`
template	A resource URI syntax that includes variables (parameters) that must be substituted before the URI is resolved.	Example: `/flight/status/{flightId}`

3.2 HTTP Method

Definition An HTTP Method as defined in RFC 2068 that specifies the desired action to be performed for a given resource. [HTTP]

Table 3.2-1 HTTP Method Attributes

Name	***Definition***	***Notes***
name	A value that indicates the name of the HTTP Method to be used.	

Table 3.2-2 HTTP Method Name Permissible Values

Value	***Definition***	***Notes***
GET	Used to request a representation of the target resource. [HTTP]	
POST	Used to submit an entity to the specified resource, often causing a change in the state of the resource. [HTTP]	
PUT	Used to replace the current resource representation with the request payload. [HTTP]	
DELETE	Used to delete the specified resource. [HTTP]	
PATCH	Used to apply partial modifications to the specified resource. [HTTP]	
CONNECT	Used to establish a tunnel to the server identified by the target resource. [HTTP]	

TRACE	Used to perform a message loop-back test along the path to the target resource. [HTTP]	

3.3 Parameter

Definition An expression, delimited by curly braces ({}), that marks a section of a URL path or query of a resource as replaceable. [OPEN-API]

Table 3.3-1 Resource Attributes

Name	***Definition***	***Notes***
name	The name of the parameter.	
description	A description of the parameter.	
type	A value that indicates the type of the parameter.	

Table 3.3-2 Parameter Type Permissible Values

Value	***Definition***	***Notes***
path	A parameter in the path of a resource.	Example: `/flight/{flight_number}` where `{flight_number}` is a parameter
query	A parameter in the query appended to the URI of a resource.	Example: `/flight?flight_number={flight_number}` where `{flight_number}` is a parameter

3.4 Representation

Definition Data that encodes information about resource state. [WEB-ARCH]

Notes The representation is carried in a Payload and contains one or more Data Entities.

Table 3.4-1 3.28 Representation Attributes

Name	***Definition***	***Notes***
content type	The format of representation data in the form of Internet media types, as defined in [RFC2046]	Example: `application/json`
content language	The natural language in which the representation is written, as defined in [RFC5646].	Example: `en-US`

4 References

[SDCM] FAA SWIM and SESAR SJU, Service Description Conceptual Model 2.0, June 2016
http://swim.aero/sdcm/2.0.0/sdcm-2.0.0.html

[HTTP] Fielding, Roy, and Julian Reschke. "Hypertext transfer protocol (http/1.1): Semantics and content." (2014).
https://tools.ietf.org/html/rfc7231

[OMG-UML] OMG Unified Modeling Language TM (OMG UML), Infrastructure, Version 2.4.1, August 2011.
http://www.omg.org/spec/UML/2.4.1/Infrastructure/PDF

[OPEN-API] OpenAPI Specification, Version 3.0.3 https://swagger.io/specification/

[REST] Fielding, Roy T., and Richard N. Taylor. Architectural styles and the design of network-based software architectures. Vol. 7. Irvine: University of California, Irvine, 2000.
https://www.ics.uci.edu/~fielding/pubs/dissertation/top.htm

[URI] Berners-Lee, Tim, Roy Fielding, and Larry Masinter. "RFC 3986, Uniform Resource Identifier (URI): Generic syntax, 2005."
https://tools.ietf.org/html/rfc3986

[WEB-ARCH] Architecture of the World Wide Web, Volume One. W3C Recommendation, 15 December 2004
https://www.w3.org/TR/webarch/

Appendix

Figure 2 shows the SDCM Model structure with the REST extension.

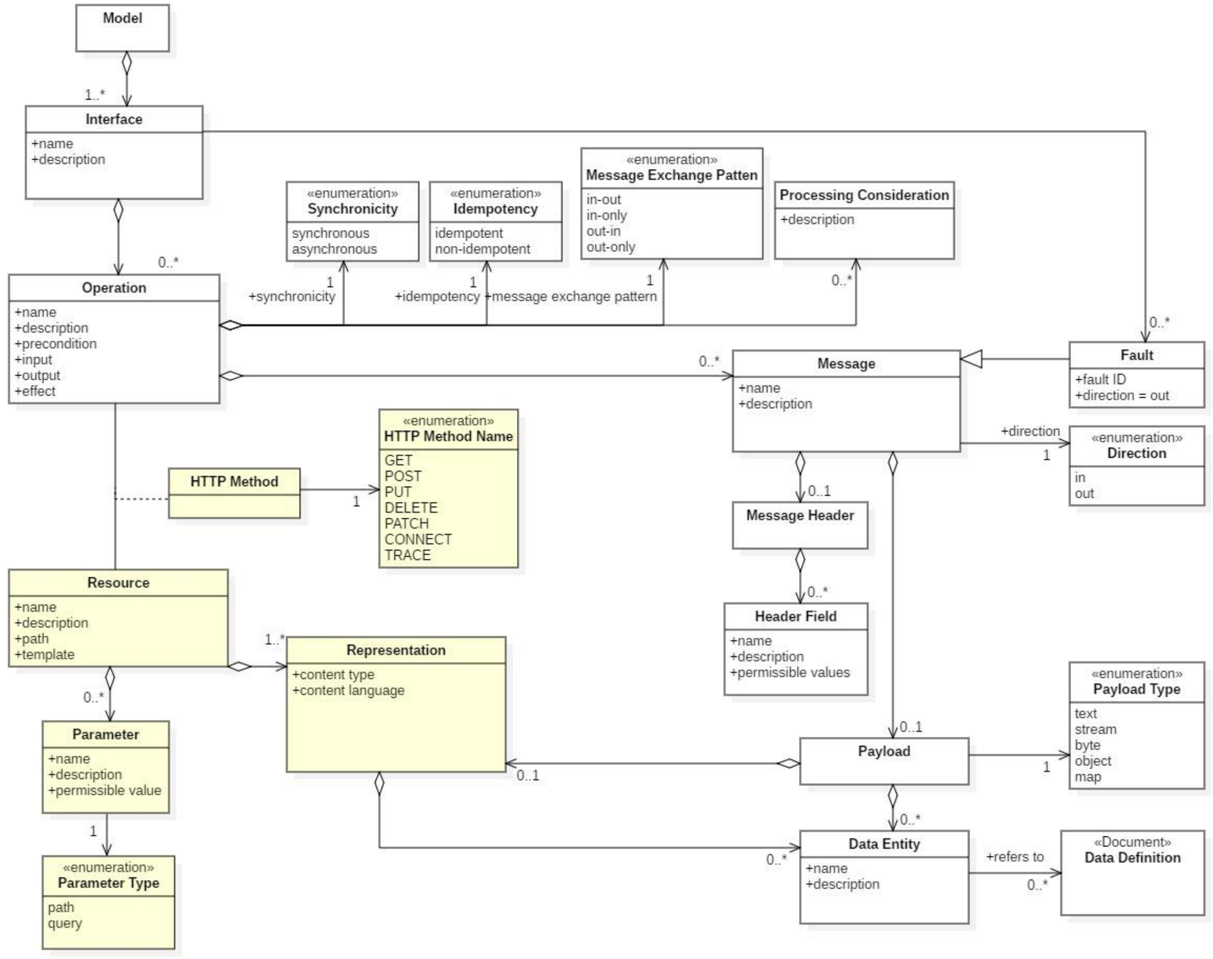

Figure 2 Model class structure with the SDCM REST Extension