

OData Version 4.0 Part 3: Common Schema Definition Language (CSDL)

Committee Specification Draft ~~01~~/02 /
Public Review Draft ~~01~~02

~~26 April~~24 June 2013

Specification URIs

This version:

~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part3-csdl/odata-v4.0-csprd01-part3-csdl.doc>~~ (Authoritative)
~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part3-csdl/odata-v4.0-csprd01-part3-csdl.html>~~
~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part3-csdl/odata-v4.0-csprd01-part3-csdl.pdf>~~
<http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part3-csdl/odata-v4.0-csprd02-part3-csdl.doc> (Authoritative)
<http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part3-csdl/odata-v4.0-csprd02-part3-csdl.html>
<http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part3-csdl/odata-v4.0-csprd02-part3-csdl.pdf>

Previous version:

N/A

<http://docs.oasis-open.org/odata/odata/v4.0/csd01/part3-csdl/odata-v4.0-csd01-part3-csdl.doc>
(Authoritative)
<http://docs.oasis-open.org/odata/odata/v4.0/csd01/part3-csdl/odata-v4.0-csd01-part3-csdl.html>
<http://docs.oasis-open.org/odata/odata/v4.0/csd01/part3-csdl/odata-v4.0-csd01-part3-csdl.pdf>

Latest version:

~~<http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.doc>~~ (Authoritative)
~~<http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.html>~~
~~<http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.pdf>~~
<http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.doc> (Authoritative)
<http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.html>
<http://docs.oasis-open.org/odata/odata/v4.0/odata-v4.0-part3-csdl.pdf>

Technical Committee:

OASIS Open Data Protocol (OData) TC

Chairs:

Barbara Hartel (~~barbara.hartel@sap.com~~barbara.hartel@sap.com), ~~SAP AG~~[SAP AG](#)
~~Ram Jeyaraman (Ram.Jeyaraman@microsoft.com)~~, Microsoft
[Ram Jeyaraman \(\[Ram.Jeyaraman@microsoft.com\]\(mailto:Ram.Jeyaraman@microsoft.com\)\)](mailto:Ram.Jeyaraman@microsoft.com), Microsoft

Editors:

~~Michael Pizzo (mikep@microsoft.com)~~, Microsoft
~~Ralf Handl (ralf.handl@sap.com)~~, ~~SAP AG~~
[Michael Pizzo \(\[mikep@microsoft.com\]\(mailto:mikep@microsoft.com\)\)](mailto:mikep@microsoft.com), Microsoft
[Ralf Handl \(\[ralf.handl@sap.com\]\(mailto:ralf.handl@sap.com\)\)](mailto:ralf.handl@sap.com), ~~SAP AG~~
[Martin Zurmuehl \(\[martin.zurmuehl@sap.com\]\(mailto:martin.zurmuehl@sap.com\)\)](mailto:martin.zurmuehl@sap.com), ~~SAP AG~~[SAP AG](#)

Additional artifacts:

This prose specification is one component of a Work Product ~~which consists of~~ that also includes:

- ~~• OData Version 4.0 Part 1: Protocol.~~ <http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part1-protocol/odata-v4.0-csprd01-part1-protocol.html>
- ~~• OData Version 4.0 Part 2: URL Conventions.~~ <http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part2-url-conventions/odata-v4.0-csprd01-part2-url-conventions.html>
- OData Version 4.0 Part 1: Protocol. <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part1-protocol/odata-v4.0-csprd02-part1-protocol.html>
- OData Version 4.0 Part 2: URL Conventions. <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part2-url-conventions/odata-v4.0-csprd02-part2-url-conventions.html>
- OData Version 4.0 Part 3: Common Schema Definition Language (CSDL) (this document). ~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part3-csdl/odata-v4.0-csprd01-part3-csdl.html>~~ <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part3-csdl/odata-v4.0-csprd02-part3-csdl.html>
- ABNF components: OData ABNF Construction Rules Version 4.0 and OData ABNF Test Cases. ~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/abnf/>~~ <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/abnf/>
- Vocabulary components: OData Core Vocabulary ~~and~~ OData Measures Vocabulary. ~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/vocabularies/>~~ and OData Capabilities Vocabulary. <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/vocabularies/>
- XML schemas: OData EDMX XML Schema and OData EDM XML Schema. ~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/schemas/>~~ <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/schemas/>
- OData Metadata Service Entity Model: ~~<http://docs.oasis-open.org/odata/odata/v4.0/csprd01/models/MetadataService.edmx>~~ <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/models/MetadataService.edmx>

Related work:

This specification is related to:

- OData Atom Format Version 4.0. Latest version. ~~<http://docs.oasis-open.org/odata/odata-atom-format/v4.0/odata-atom-format-v4.0.html>~~ <http://docs.oasis-open.org/odata/odata-atom-format/v4.0/odata-atom-format-v4.0.html>.
- OData JSON Format Version 4.0. Latest version. ~~<http://docs.oasis-open.org/odata/odata-json-format/v4.0/odata-json-format-v4.0.html>~~ <http://docs.oasis-open.org/odata/odata-json-format/v4.0/odata-json-format-v4.0.html>.

Declared XML namespaces:

- ~~• <http://docs.oasis-open.org/odata/ns/edmx>~~
- ~~• <http://docs.oasis-open.org/odata/ns/edm>~~
- <http://docs.oasis-open.org/odata/ns/edmx>
- <http://docs.oasis-open.org/odata/ns/edm>

Abstract:

The Open Data Protocol (OData) enables the creation of REST-based data services, which allow resources, identified using Uniform Resource Identifiers (URIs) and defined in an Entity Data Model (EDM), to be published and edited by Web clients using simple HTTP messages. ~~This document defines the core semantics and facilities of the protocol.~~ OData version 4.0 defines the core semantics and facilities of the protocol, a set of recommended (but not required) rules for constructing URLs to identify the data and metadata exposed by an OData service as well as a set of reserved URL query string operators, an Entity Data Model (EDM), and an XML representation of the entity data model exposed by an OData service. OData Atom Format version 4.0 extends the former by defining representations for OData requests and responses using an Atom format.

Status:

This document was last revised or approved by the OASIS Open Data Protocol (OData) TC on the above date. The level of approval is also listed above. Check the "Latest version" location noted above for possible later revisions of this document.

Technical Committee members should send comments on this specification to the Technical Committee's email list. Others should send comments to the Technical Committee by using the "Send A Comment" button on the Technical Committee's web page at <http://www.oasis-open.org/committees/odata/> <http://www.oasis-open.org/committees/odata/>.

For information on whether any patents have been disclosed that may be essential to implementing this specification, and any offers of patent licensing terms, please refer to the Intellectual Property Rights section of the Technical Committee web page (<http://www.oasis-open.org/committees/odata/ipr.php> <http://www.oasis-open.org/committees/odata/ipr.php>).

Citation format:

When referencing this specification the following citation format should be used:

[OData-Part3]

OData Version 4.0 Part 3: Common Schema Definition Language (CSDL). ~~26 April~~24 June 2013. OASIS Committee Specification Draft ~~01~~02 / Public Review Draft ~~01~~. <http://docs.oasis-open.org/odata/odata/v4.0/csprd01/part3-csdl/odata-v4.0-csprd01-part3-csdl.html>02. <http://docs.oasis-open.org/odata/odata/v4.0/csprd02/part3-csdl/odata-v4.0-csprd02-part3-csdl.html>.

Notices

Copyright © OASIS Open 2013. All Rights Reserved.

All capitalized terms in the following text have the meanings assigned to them in the OASIS Intellectual Property Rights Policy (the "OASIS IPR Policy"). The full [Policy](#) may be found at the OASIS website.

This document and translations of it may be copied and furnished to others, and derivative works that comment on or otherwise explain it or assist in its implementation may be prepared, copied, published, and distributed, in whole or in part, without restriction of any kind, provided that the above copyright notice and this section are included on all such copies and derivative works. However, this document itself may not be modified in any way, including by removing the copyright notice or references to OASIS, except as needed for the purpose of developing any document or deliverable produced by an OASIS Technical Committee (in which case the rules applicable to copyrights, as set forth in the OASIS IPR Policy, must be followed) or as required to translate it into languages other than English.

The limited permissions granted above are perpetual and will not be revoked by OASIS or its successors or assigns.

This document and the information contained herein is provided on an "AS IS" basis and OASIS DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY WARRANTY THAT THE USE OF THE INFORMATION HEREIN WILL NOT INFRINGE ANY OWNERSHIP RIGHTS OR ANY IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

OASIS requests that any OASIS Party or any other party that believes it has patent claims that would necessarily be infringed by implementations of this OASIS Committee Specification or OASIS Standard, to notify OASIS TC Administrator and provide an indication of its willingness to grant patent licenses to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this specification.

OASIS invites any party to contact the OASIS TC Administrator if it is aware of a claim of ownership of any patent claims that would necessarily be infringed by implementations of this specification by a patent holder that is not willing to provide a license to such patent claims in a manner consistent with the IPR Mode of the OASIS Technical Committee that produced this specification. OASIS may include such claims on its website, but disclaims any obligation to do so.

OASIS takes no position regarding the validity or scope of any intellectual property or other rights that might be claimed to pertain to the implementation or use of the technology described in this document or the extent to which any license under such rights might or might not be available; neither does it represent that it has made any effort to identify any such rights. Information on OASIS' procedures with respect to rights in any document or deliverable produced by an OASIS Technical Committee can be found on the OASIS website. Copies of claims of rights made available for publication and any assurances of licenses to be made available, or the result of an attempt made to obtain a general license or permission for the use of such proprietary rights by implementers or users of this OASIS Committee Specification or OASIS Standard, can be obtained from the OASIS TC Administrator. OASIS makes no representation that any information or list of intellectual property rights will at any time be complete, or that any claims in such list are, in fact, Essential Claims.

The name "OASIS" is a trademark of [OASIS](#), the owner and developer of this specification, and should be used only to refer to the organization and its official outputs. OASIS welcomes reference to, and implementation and use of, specifications, while reserving the right to enforce its marks against misleading uses. Please see <http://www.oasis-open.org/policies-guidelines/trademark> for above guidance.

Table of Contents

1	Introduction.....	9
1.1	Terminology.....	9
1.2	Normative References.....	9
2	GSDL Namespaces.....	10
2.1	Namespace EDMX.....	10
2.2	Namespace EDM.....	10
2.3	XML Schema Definitions.....	10
3	Entity Model Wrapper.....	11
3.1	Element <code>edmx:Edmx</code>	11
3.1.1	Attribute <code>Version</code>	11
3.2	Element <code>edmx:DataServices</code>	11
3.3	Element <code>edmx:Reference</code>	11
3.3.1	Attribute <code>Uri</code>	12
3.4	Element <code>edmx:Include</code>	12
3.4.1	Attribute <code>Namespace</code>	12
3.4.2	Attribute <code>Alias</code>	12
3.5	Element <code>edmx:IncludeAnnotations</code>	13
3.5.1	Attribute <code>TermNamespace</code>	13
3.5.2	Attribute <code>Qualifier</code>	13
4	Common Characteristics of Entity Models.....	14
4.1	Nominal Types.....	14
4.2	Structured Types.....	14
4.3	Structural Properties.....	14
4.4	Primitive Types.....	14
4.5	Built-In Abstract Types.....	16
4.6	Annotations.....	16
5	Schema.....	17
5.1	Element <code>edm:Schema</code>	17
5.1.1	Attribute <code>Namespace</code>	17
5.1.2	Attribute <code>Alias</code>	17
6	Property.....	18
6.1	Element <code>edm:Property</code>	18
6.1.1	Attribute <code>Name</code>	18
6.1.2	Attribute <code>Type</code>	18
6.2	Property Facets.....	18
6.2.1	Attribute <code>Nullable</code>	19
6.2.2	Attribute <code>MaxLength</code>	19
6.2.3	Attribute <code>Precision</code>	19
6.2.4	Attribute <code>Scale</code>	19
6.2.5	Attribute <code>Unicode</code>	19
6.2.6	Attribute <code>SRID</code>	19
6.2.7	Attribute <code>DefaultValue</code>	20

7	Navigation Property	21
7.1	Element <code>edm:NavigationProperty</code>	21
7.1.1	Attribute <code>Name</code>	21
7.1.2	Attribute <code>Type</code>	21
7.1.3	Attribute <code>Nullable</code>	21
7.1.4	Attribute <code>Partner</code>	21
7.1.5	Attribute <code>ContainsTarget</code>	22
7.2	Element <code>edm:ReferentialConstraint</code>	22
7.3	Element <code>edm:OnDelete</code>	22
8	Entity Type	24
8.1	Element <code>edm:EntityType</code>	24
8.1.1	Attribute <code>Name</code>	24
8.1.2	Attribute <code>BaseType</code>	24
8.1.3	Attribute <code>Abstract</code>	25
8.1.4	Attribute <code>OpenType</code>	25
8.1.5	Attribute <code>HasStream</code>	25
8.2	Element <code>edm:Key</code>	25
8.3	Element <code>edm:PropertyRef</code>	26
8.3.1	Attribute <code>Name</code>	26
8.3.2	Attribute <code>Alias</code>	26
9	Complex Type	28
9.1	Element <code>edm:ComplexType</code>	28
9.1.1	Attribute <code>Name</code>	28
9.1.2	Attribute <code>BaseType</code>	28
9.1.3	Attribute <code>Abstract</code>	28
9.1.4	Attribute <code>OpenType</code>	29
10	Enumeration Type	30
10.1	Element <code>edm:EnumType</code>	30
10.1.1	Attribute <code>Name</code>	30
10.1.2	Attribute <code>UnderlyingType</code>	30
10.1.3	Attribute <code>IsFlags</code>	30
10.2	Element <code>edm:Member</code>	30
10.2.1	Attribute <code>Name</code>	31
10.2.2	Attribute <code>Value</code>	31
11	Type Definition	32
11.1	Element <code>edm:TypeDefinition</code>	32
11.1.1	Attribute <code>Name</code>	32
11.1.2	Attribute <code>UnderlyingType</code>	32
11.1.3	Type Definition Facets	32
12	Action and Function	33
12.1	Element <code>edm:Action</code>	33
12.1.1	Attribute <code>Name</code>	33
12.1.2	Attribute <code>ReturnType</code>	33

12.1.3	Attribute IsBindable	33
12.1.4	Attribute EntitySetPath	33
12.2	Element edm:Function	34
12.2.1	Attribute Name	34
12.2.2	Attribute ReturnType	34
12.2.3	Attribute IsBindable	34
12.2.4	Attribute IsComposable	34
12.2.5	Attribute EntitySetPath	34
12.3	Element edm:ReturnType	35
12.3.1	Attribute Type	35
12.4	Element edm:Parameter	35
12.4.1	Attribute Name	35
12.4.2	Attribute Type	35
12.4.3	Parameter Facets	35
13	Entity Container	36
13.1	Element edm:EntityContainer	37
13.1.1	Attribute Name	37
13.1.2	Attribute IsDefaultEntityContainer	37
13.1.3	Attribute Extends	37
13.2	Element edm:EntitySet	37
13.2.1	Attribute Name	37
13.2.2	Attribute EntityType	37
13.2.3	Attribute IncludeInServiceDocument	37
13.3	Element edm:NavigationPropertyBinding	38
13.3.1	Attribute Path	38
13.3.2	Attribute EntitySet	38
13.4	Element edm:Entity	38
13.4.1	Attribute Name	38
13.4.2	Attribute Type	38
13.5	Element edm:ActionImport	38
13.5.1	Attribute Name	39
13.5.2	Attribute Action	39
13.5.3	Attribute EntitySet	39
13.6	Element edm:FunctionImport	39
13.6.1	Attribute Name	39
13.6.2	Attribute Function	39
13.6.3	Attribute EntitySet	39
13.6.4	Attribute IncludeInServiceDocument	40
14	Vocabulary and Annotation	41
14.1	Element Term	42
14.1.1	Attribute Name	42
14.1.2	Attribute Type	42
14.1.3	Attribute DefaultValue	42

14.1.4	Attribute AppliesTo	42
14.1.5	Term Facets	43
14.2	Element edm:Annotations	43
14.2.1	Attribute Target	43
14.2.2	Attribute Qualifier	43
14.3	Element edm:Annotation	43
14.3.1	Attribute Term	44
14.3.2	Attribute Qualifier	44
14.4	Constant Expressions	45
14.4.1	Expression edm:Bool	45
14.4.2	Expression edm:Date	45
14.4.3	Expression edm:DateTimeOffset	46
14.4.4	Expression edm:Decimal	46
14.4.5	Expression edm:Duration	46
14.4.6	Expression edm:EnumMember	46
14.4.7	Expression edm:Float	47
14.4.8	Expression edm:Guid	47
14.4.9	Expression edm:Int	47
14.4.10	Expression edm:String	47
14.4.11	Expression edm:TimeOfDay	47
14.5	Dynamic Expressions	48
14.5.1	Expression edm:Apply	48
14.5.1.1	Attribute Function	48
14.5.2	Expression edm:AssertType	49
14.5.2.1	Attribute Type	49
14.5.3	Expression edm:Collection	50
14.5.4	Expression edm:If	50
14.5.5	Expression edm:IsType	50
14.5.5.1	Attribute Type	51
14.5.6	Expression edm:LabeledElement	51
14.5.6.1	Attribute Name	51
14.5.7	Expression edm:LabeledElementReference	51
14.5.8	Expression edm:Null	51
14.5.9	Expression edm:NavigationPropertyPath	51
14.5.10	Expression edm:Path	52
14.5.11	Expression edm:PropertyPath	53
14.5.12	Expression edm:Record	53
14.5.12.1	Attribute Type	54
14.5.12.2	Element edm:PropertyValue	54
14.5.13	Expression edm:Url	54
15	Metadata Service Schema	55
16	CSDL Examples	57
16.1	Products and Categories Example	57
16.2	Annotated Customers and Orders Example	58

17	Attribute Values	61
17.1	Namespace	61
17.2	SimpleIdentifier	61
17.3	QualifiedName	61
17.4	TypeName	61
17.5	Boolean	61
18	Conformance	62
Appendix A.	Acknowledgments	63
Appendix B.	Revision History	64
1	Introduction	14
1.1	Terminology	14
1.2	Normative References	14
1.3	Typographical Conventions	15
2	CSDL Namespaces	16
2.1	Namespace EDMX	16
2.2	Namespace EDM	16
2.3	XML Schema Definitions	16
2.4	XML Document Order	17
3	Entity Model Wrapper	18
3.1	Element <code>edmx:Edmx</code>	18
3.1.1	Attribute <code>Version</code>	18
3.2	Element <code>edmx:DataServices</code>	18
3.3	Element <code>edmx:Reference</code>	18
3.3.1	Attribute <code>Uri</code>	19
3.4	Element <code>edmx:Include</code>	19
3.4.1	Attribute <code>Namespace</code>	19
3.4.2	Attribute <code>Alias</code>	19
3.5	Element <code>edmx:IncludeAnnotations</code>	20
3.5.1	Attribute <code>TermNamespace</code>	21
3.5.2	Attribute <code>Qualifier</code>	21
3.5.3	Attribute <code>TargetNamespace</code>	21
4	Common Characteristics of Entity Models	22
4.1	Nominal Types	22
4.2	Structured Types	22
4.3	Structural Properties	22
4.4	Primitive Types	22
4.5	Built-In Abstract Types	24
4.6	Annotations	24
5	Schema	26
5.1	Element <code>edm:Schema</code>	26
5.1.1	Attribute <code>Namespace</code>	26
5.1.2	Attribute <code>Alias</code>	27
6	Structural Property	28
6.1	Element <code>edm:Property</code>	28

6.1.1	Attribute Name	28
6.1.2	Attribute Type	28
6.2	Property Facets	28
6.2.1	Attribute Nullable.....	29
6.2.2	Attribute MaxLength.....	29
6.2.3	Attribute Precision.....	29
6.2.4	Attribute Scale	29
6.2.5	Attribute Unicode.....	30
6.2.6	Attribute SRID	30
6.2.7	Attribute DefaultValue	30
7	Navigation Property.....	31
7.1	Element edm:NavigationProperty.....	31
7.1.1	Attribute Name	31
7.1.2	Attribute Type	31
7.1.3	Attribute Nullable.....	31
7.1.4	Attribute Partner.....	32
7.1.5	Attribute ContainsTarget.....	32
7.2	Element edm:ReferentialConstraint.....	33
7.2.1	Attribute Property.....	33
7.2.2	Attribute ReferencedProperty.....	33
7.3	Element edm:OnDelete.....	33
7.3.1	Attribute Action	33
8	Entity Type	35
8.1	Element edm:EntityType	35
8.1.1	Attribute Name	36
8.1.2	Attribute BaseType.....	36
8.1.3	Attribute Abstract.....	36
8.1.4	Attribute OpenType.....	36
8.1.5	Attribute HasStream.....	36
8.2	Element edm:Key	36
8.3	Element edm:PropertyRef	38
8.3.1	Attribute Name	38
8.3.2	Attribute Alias	38
9	Complex Type	39
9.1	Element edm:ComplexType.....	39
9.1.1	Attribute Name	39
9.1.2	Attribute BaseType.....	40
9.1.3	Attribute Abstract.....	40
9.1.4	Attribute OpenType.....	40
10	Enumeration Type	41
10.1	Element edm:EnumType.....	41
10.1.1	Attribute Name	41
10.1.2	Attribute UnderlyingType.....	41

10.1.3 Attribute IsFlags	41
10.2 Element edm:Member	41
10.2.1 Attribute Name	42
10.2.2 Attribute Value	42
11 Type Definition	43
11.1 Element edm:TypeDefinition	43
11.1.1 Attribute Name	43
11.1.2 Attribute UnderlyingType	43
11.1.3 Type Definition Facets	43
12 Action and Function	44
12.1 Element edm:Action	44
12.1.1 Attribute Name	44
12.1.2 Attribute ReturnType	44
12.1.3 Attribute IsBound	44
12.1.4 Attribute EntitySetPath	44
12.2 Element edm:Function	45
12.2.1 Attribute Name	45
12.2.2 Attribute ReturnType	46
12.2.3 Attribute IsBound	46
12.2.4 Attribute IsComposable	46
12.2.5 Attribute EntitySetPath	46
12.3 Element edm:ReturnType	46
12.3.1 Attribute Type	47
12.3.2 Attribute Nullable	47
12.4 Element edm:Parameter	47
12.4.1 Attribute Name	47
12.4.2 Attribute Type	47
12.4.3 Attribute Nullable	47
12.4.4 Parameter Facets	47
13 Entity Container	48
13.1 Element edm:EntityContainer	49
13.1.1 Attribute Name	49
13.1.2 Attribute Extends	49
13.2 Element edm:EntitySet	50
13.2.1 Attribute Name	50
13.2.2 Attribute EntityType	50
13.2.3 Attribute IncludeInServiceDocument	50
13.3 Element edm:Singleton	50
13.3.1 Attribute Name	50
13.3.2 Attribute Type	50
13.4 Element edm:NavigationPropertyBinding	51
13.4.1 Attribute Path	51
13.4.2 Attribute Target	51

13.5 Element <code>edm:ActionImport</code>	52
13.5.1 Attribute <code>Name</code>	52
13.5.2 Attribute <code>Action</code>	52
13.5.3 Attribute <code>EntitySet</code>	52
13.6 Element <code>edm:FunctionImport</code>	52
13.6.1 Attribute <code>Name</code>	52
13.6.2 Attribute <code>Function</code>	53
13.6.3 Attribute <code>EntitySet</code>	53
13.6.4 Attribute <code>IncludeInServiceDocument</code>	53
14 Vocabulary and Annotation	54
14.1 Element <code>edm:Term</code>	55
14.1.1 Attribute <code>Name</code>	55
14.1.2 Attribute <code>Type</code>	55
14.1.3 Attribute <code>DefaultValue</code>	55
14.1.4 Attribute <code>AppliesTo</code>	56
14.1.5 Attribute <code>Term Facets</code>	56
14.2 Element <code>edm:Annotations</code>	56
14.2.1 Attribute <code>Target</code>	56
14.2.2 Attribute <code>Qualifier</code>	57
14.3 Element <code>edm:Annotation</code>	57
14.3.1 Attribute <code>Term</code>	59
14.3.2 Attribute <code>Qualifier</code>	59
14.4 Constant Expressions	59
14.4.1 Expression <code>edm:Binary</code>	59
14.4.2 Expression <code>edm:Bool</code>	60
14.4.3 Expression <code>edm:Date</code>	60
14.4.4 Expression <code>edm:DateTimeOffset</code>	60
14.4.5 Expression <code>edm:Decimal</code>	60
14.4.6 Expression <code>edm:Duration</code>	61
14.4.7 Expression <code>edm:EnumMember</code>	61
14.4.8 Expression <code>edm:Float</code>	61
14.4.9 Expression <code>edm:Guid</code>	62
14.4.10 Expression <code>edm:Int</code>	62
14.4.11 Expression <code>edm:String</code>	62
14.4.12 Expression <code>edm:TimeOfDay</code>	62
14.5 Dynamic Expressions	63
14.5.1 Comparison and Logical Operators	63
14.5.2 Expression <code>edm:AnnotationPath</code>	63
14.5.3 Expression <code>edm:Apply</code>	64
14.5.4 Expression <code>edm:Cast</code>	65
14.5.5 Expression <code>edm:Collection</code>	66
14.5.6 Expression <code>edm:If</code>	66
14.5.7 Expression <code>edm:IsOf</code>	67

14.5.8 Expression edm:LabeledElement	67
14.5.9 Expression edm:LabeledElementReference	68
14.5.10 Expression edm:Null	68
14.5.11 Expression edm:NavigationPropertyPath	68
14.5.12 Expression edm:Path	69
14.5.13 Expression edm:PropertyPath	70
14.5.14 Expression edm:Record	70
14.5.15 Expression edm:UrlRef	71
15 Metadata Service Schema	72
15.1 Entity Model Wrapper	73
15.2 Schema	74
15.3 Types	75
15.4 Properties	76
15.5 Actions and Functions	79
15.6 Entity Container	80
15.7 Terms and Annotations	82
16 CSDL Examples	86
16.1 Products and Categories Example	86
16.2 Annotations for Products and Categories Example	88
17 Attribute Values	91
17.1 Namespace	91
17.2 SimpleIdentifier	91
17.3 QualifiedName	91
17.4 TypeName	91
17.5 TargetPath	91
17.6 Boolean	92
18 Conformance	93
Appendix A. Acknowledgments	94
Appendix B. Revision History	95

1 Introduction

OData services are described in terms of an Entity Data Model (EDM). The Common Schema Definition Language (CSDL) defines an XML representation of the entity data model exposed by an OData service. CSDL is articulated in the Extensible Markup Language (XML) 1.1 (Second Edition) [XML-1.1] with further building blocks from the W3C XML Schema Definition Language (XSD) 1.1 as described in [XML-Schema-1] and [XML-Schema-2].

1.1 Terminology

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].

1.2 Normative References

[EPSG]	European Petroleum Survey Group (EPSG). http://www.epsg.org/Geodetic.html .
[OData-ABNF]	<i>OData ABNF Construction Rules Version 4.0</i> . See link in “Additional artifacts” section on cover page.
[OData-Atom]	<i>OData ATOM Format Version 4.0</i> . See link in “Related work” section on cover page.
[OData-EDM]	<i>OData EDM XML Schema</i> . See link in “Additional artifacts” section on cover page.
[OData-EDMX]	<i>OData EDMX XML Schema</i> . See link in “Additional artifacts” section on cover page.
[OData-JSON]	<i>OData JSON Format Version 4.0</i> . See link in “Related work” section on cover page.
[OData-Meta]	<i>OData Metadata Service Entity Model Schema</i> . See link in “Additional artifacts” section on cover page.
[OData-Protocol]	<i>OData Version 4.0 Part 1: Protocol</i> . See link in “Additional artifacts” section on cover page.
[OData-URL]	<i>OData Version 4.0 Part 2: URL Conventions</i> . See link in “Additional artifacts” section on cover page.
[OData-VocCore]	<i>OData Core Vocabulary</i> . See link in “Additional artifacts” section on cover page.
[RFC2119]	Bradner, S., “Key words for use in RFCs to Indicate Requirement Levels”, BCP 14, RFC 2119, March 1997. http://www.ietf.org/rfc/rfc2119.txt .
[RFC6570]	Gregorio, J., et al. , Fielding, R., Hadley, M., Nottingham, M., and D. Orchard, “URI Template”, RFC 6570, March 2012. http://tools.ietf.org/html/rfc6570 .
[XML-1.1]	Extensible Markup Language (XML) 1.1 (Second Edition) , Paoli, J., Sperberg-McQueen, C. M., <i>Extensible Markup Language (XML) 1.1 (Second Edition)</i> , F. Yergeau, F., E. Maler, J. Cowan, J., Maler, E., T. Bray, T., C. M. Sperberg-McQueen, J. Paoli, Editors, W3C Recommendation, 16 August 2006, http://www.w3.org/TR/2006/REC-xml11-20060816 http://www.w3.org/TR/2006/REC-xml11-20060816 . Latest version Latest version available at http://www.w3.org/TR/xml11/ .
[XML-Base]	XML Base (Second Edition) XML Base (Second Edition), J. Marsh, J., R. Tobin, R., Editors, W3C Recommendation, 28 January 2009,

[XML-Schema-1]

~~<http://www.w3.org/TR/2009/REC-xmlbase-20090128/>~~
~~<http://www.w3.org/TR/2009/REC-xmlbase-20090128/>~~. Latest version
Latest version available at
~~<http://www.w3.org/TR/xmlbase>~~.~~<http://www.w3.org/TR/xmlbase/>~~.
W3C XML Schema Definition Language (XSD) 1.1 Part 1: Structures, W3C XML
Schema Definition Language (XSD) 1.1 Part 1: Structures, D. Beech, M.
Maloney, C. M. Sperberg-McQueen, ~~C. M.~~, ~~Beech, D.~~, H. S. Thompson, S. Gao,
S., ~~Maloney, M.~~, ~~N.~~ Mendelsohn, N., Thompson, H. S., Editors, W3C
Recommendation, 5 April 2012, ~~<http://www.w3.org/TR/2012/REC-xmlschema11-1-20120405/>~~
~~<http://www.w3.org/TR/2012/REC-xmlschema11-1-20120405/>~~.
Latest version available at ~~<http://www.w3.org/TR/xmlschema11-1/>~~
~~<http://www.w3.org/TR/xmlschema11-1/>~~.

[XML-Schema-2]

~~W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes~~, Malhotra,
A., W3C XML Schema Definition Language (XSD) 1.1 Part 2: Datatypes, D.
Peterson, S. Gao, C. M. Sperberg-McQueen, ~~C. M.~~, ~~Gao, H. S.~~, Thompson, H.
S., ~~Peterson, D.~~, P. V. Biron, P. V., A. Malhotra, Editors, W3C Recommendation, 5
April 2012, ~~<http://www.w3.org/TR/2012/REC-xmlschema11-2-20120405/>~~.
Latest version available at ~~<http://www.w3.org/TR/xmlschema11-2/>~~.
~~<http://www.w3.org/TR/2012/REC-xmlschema11-2-20120405/>~~.
Latest version available at ~~<http://www.w3.org/TR/xmlschema11-2/>~~.

1.3 Typographical Conventions

Keywords defined by this specification use this monospaced font.

Normative source code uses this paragraph style.

Some sections of this specification are illustrated with non-normative examples.

Example 1: text describing an example uses this paragraph style

Non-normative examples use this paragraph style.

All examples in this document are non-normative and informative only.

All other text is normative unless otherwise labeled.

2 CSDL Namespaces

In addition to the default XML namespace, the elements and attributes used to describe the entity model of an OData service are defined in one of the following namespaces. An XML document using these namespaces and having an ~~edmx:Edmx~~edmx:Edmx root element will be called a CSDL document.

2.1 Namespace EDMX

Elements and attributes associated with the top-level wrapper that contains the CSDL used to define the entity model for an OData Service are qualified with the Entity Data Model for Data Services Packaging namespace:

- `http://docs.oasis-open.org/odata/ns/edmx`

Prior versions of OData used the following namespace for EDMX:

- EDMX version 1.0: `http://schemas.microsoft.com/ado/2007/06/edmx`

They are non-normative for this specification.

In this specification the namespace prefix `edmx` is used to represent the Entity Data Model for Data Services Packaging namespace, however the prefix name is not prescriptive.

2.2 Namespace EDM

Elements and attributes that define the entity model exposed by the OData Service are qualified with the Entity Data Model namespace:

- `http://docs.oasis-open.org/odata/ns/edm`

Prior versions of CSDL used the following namespaces for EDM:

- CSDL version 1.0: `http://schemas.microsoft.com/ado/2006/04/edm`
- CSDL version 1.1: `http://schemas.microsoft.com/ado/2007/05/edm`
- CSDL version 1.2: `http://schemas.microsoft.com/ado/2008/01/edm`
- CSDL version 2.0: `http://schemas.microsoft.com/ado/2008/09/edm`
- CSDL version 3.0: `http://schemas.microsoft.com/ado/2009/11/edm`

They are non-normative for this specification.

In this specification the namespace prefix `edm` is used to represent the Entity Data Model namespace, however the prefix name is not prescriptive.

2.3 XML Schema Definitions

This specification contains normative XML schemas for the EDMX and EDM namespaces; see ~~links in the "Additional artifacts" section on the cover page:~~[\[OData-EDMX\]](#) and [\[OData-EDM\]](#).

These XML schemas only define the shape of a well-formed CSDL document, but are not descriptive enough to define what a correct CSDL document MUST be in every imaginable ~~use case~~use case. This specification document defines additional rules that correct CSDL documents MUST fulfill. In case of doubt on what makes a CSDL document correct the rules defined in this specification document take precedence.

2.4 XML Document Order

Client libraries MUST retain the document order of XML elements for CSDL documents because for some elements the order of child elements is significant. This includes, but is not limited to, members of enumeration types and items within a collection-valued annotation.

OData does not impose any ordering constraints on XML attributes within XML elements.

3 Entity Model Wrapper

An OData service exposes a single entity model. This model may be distributed over several schemas, and these schemas may be distributed over several physical locations. The entity model wrapper provides a single point of access to these parts by including them directly or referencing their physical locations.

A service is defined by a single CSDL document which can be accessed by sending a GET request to `<serviceRoot>/$metadata`. This document is called the metadata document. It may reference other CSDL documents.

The ~~service consists of all entity containers defined in the~~ metadata document. These contains a single entity container that defines the resources exposed by this service. This entity containerscontainer MAY extendextend an entity containerscontainer defined in referenced documentsreferenced documents.

The *model* of the service consists of all CSDL constructs used in its entity containers.

3.1 Element `edmx:Edmx`

~~The metadata~~ A CSDL document MUST contain a ~~single-root~~ `edmx:Edmx` element. This element MUST contain a single direct child ~~`edmx:DataServices`~~`edmx:DataServices` element.

In addition to the data services element, the `Edmx` element contains zero or more ~~`edmx:Reference`~~`edmx:Reference` elements. ~~Reference elements specify the location of schemas used by the OData service.~~

~~The following example demonstrates the basic structure of the `edmx:Edmx` element and the `edmx:DataServices` element:~~

Example 2:

```
<edmx:Edmx xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx"
  Version="4.0">
  <edmx:DataServices>
    <Schema ... />
    ...
  </edmx:DataServices>
</edmx:Edmx>
```

3.1.1 Attribute `Version`

The `edmx:Edmx` element MUST provide the value 4.0 for the `Version` attribute. ~~MUST be present on the `edmx:Edmx` element.~~

~~The `Version` attribute is a string value that. It specifies the version of the EDMX wrapper, and must be of the form `<majorversion>.<minorversion>`. This defined by this version of the specification defines version 4.0 of the EDMX Wrapper.~~

3.2 Element `edmx:DataServices`

The `edmx:DataServices` element ~~contains zero or more~~ MUST contain at least one ~~`edmx:Schema`~~`edmx:Schema` ~~elements~~element which define the schema(s) exposed by the OData service.

3.3 Element `edmx:Reference`

The `edmx:Reference` element specifies external CSDL documents referenced by the referencing document. The child elements ~~`edmx:Include`~~`edmx:Include` and ~~`edmx:IncludeAnnotations`~~`edmx:IncludeAnnotations` specify which parts of the referenced

document are available for use in the referencing document. The ~~edm:Reference~~edm:Reference element MUST contain at least one ~~edm:Include~~edm:Include or ~~edm:IncludeAnnotations~~edm:IncludeAnnotations child element.

The edm:Reference element contains zero or more edm:Annotation elements.

The *scope* of a CSDL document is the document itself and all schemas included from directly referenced documents. All entity types, complex types and other named elements *in scope* (that is, defined in the document itself or a schema of a directly referenced document) can be accessed from a referencing document by their namespace-qualified names.

Referencing another document may alter the model defined by the referencing document. For instance, if a referenced document defines an entity type derived from an entity type in the referencing document, then an ~~entity set~~entity set of the service defined by the referencing document may return entities of the derived type. This is identical to the behavior if the derived type had been defined directly in the referencing document.

Note: referencing documents is not recursive. Only named elements defined in directly referenced documents can be accessed; elements that are defined in documents that are only referenced by referenced documents cannot be accessed.

~~The following example demonstrates usage of the reference element~~Example 3: to reference entity models that containcontaining definitions of vocabulary terms:

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<edm:Edmx xmlns:edm="http://docs.oasis-open.org/odata/ns/edm"
  Version="4.0">
  <edm:Reference Uri="http://vocabs.odata.org/capabilities/v1">
    <edm:Include Namespace="Org.OData.Capabilities.V1" />
  </edm:Reference>
  <edm:Reference Uri="http://vocabs.odata.org/display/v1">
    <edm:Include Alias="UI" Namespace="org.example.Display" />
  </edm:Reference>
  <edm:DataServices>...</edm:DataServices>
</edm:Edmx>
```

3.3.1 Attribute Uri

The ~~edm:Reference~~edm:Reference element MUST specify a Uri attribute. The Uri attribute uniquely identifies a model, so two references MUST NOT specify the same URI. The value of the Uri attribute SHOULD be URL that locates a CSDL document describing the referenced model. If the URI is not dereferencable it SHOULD identify a well-known schema. The value of the Uri attribute MAY be an absolute or relative URI; relative URIs are relative to the xml:base attribute, see [XML-Base].

3.4 Element edm:Include

~~The edm:Reference~~The edm:Reference element contains zero or more edm:Include elements that specify the schemas to include from the target document.

3.4.1 Attribute Namespace

The ~~edm:Include~~edm:Include element MUST provide a ~~Namespace~~Namespace value for the Namespace attribute. The value MUST match the namespace of a schema defined in the referenced CSDL document. The same namespace MUST NOT be included more than once, even if it is declared in more than one referenced document.

3.4.2 Attribute Alias

An ~~edm:Include~~edm:Include element MAY define a ~~SimpleIdentifier~~SimpleIdentifier value for the Alias attribute. The Alias attribute defines an alias for the specified Namespace that can be used in

qualified names instead of the namespace. It only provides a more convenient notation. Every model element that can be used via an alias-qualified name can alternatively also be used via its full namespace-qualified name. An alias allows a short string to be substituted for a long namespace. For instance, an alias of `display` might be assigned to the namespace

`org.example.vocabularies.display`. An alias-qualified name is resolved to a fully qualified name by examining aliases on `edm:Include` and `edm:Schema` elements within the same document.

Aliases are document-global, so `edm:Include` and `edm:Schema` elements within a document MUST NOT assign the same alias to different namespaces.

The `Alias` attribute MUST NOT use the reserved values `Edm`, `odata`, `System`, or `Transient`.

An alias is only valid within the document in which it is declared; a referencing document has to define its own aliases with the `edm:Include` element.

3.5 Element `edm:IncludeAnnotations`

The `edm:Reference` element contains zero or more `edm:IncludeAnnotations` elements that specify the annotations to include from the target document. If no `edm:IncludeAnnotations` element is specified, a client MAY ignore all annotations in the referenced document that are not explicitly used in an `edm:Path` expression of the referencing document.

~~The following example demonstrates using the `edm:IncludeAnnotations` element to~~ [Example 4](#): ~~reference documents that contain annotations:~~

~~The following example demonstrates using the `edm:IncludeAnnotations` element to reference documents that contain annotations:~~

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<edm:Edmx xmlns:edm="http://docs.oasis-open.org/odata/ns/edm"
  Version="4.0">
  <edm:Reference Uri="http://odata.org/ann/b">
    <edm:IncludeAnnotations TermNamespace="org.example.validation" />
    <edm:IncludeAnnotations TermNamespace="org.example.display"
      Qualifier="Tablet" />
    <edm:IncludeAnnotations TermNamespace="org.example.hcm"
      TargetNamespace="com.contoso.Sales" />
    <edm:IncludeAnnotations TermNamespace="org.example.hcm"
      Qualifier="Tablet"
      TargetNamespace="com.contoso.Person" />
  </edm:Reference>
  <edm:DataServices-->...</edm:DataServices>
</edm:Edmx>
```

The following annotations from `http://odata.org/ann/b`, are included:

- Annotations that use a term from the `org.example.validation` namespace, and
- Annotations that use a term from the `org.example.display` namespace and specify a `Tablet` qualifier, and
- Annotations that apply a term from the `org.example.hcm` namespace to an element of the `com.contoso.Sales` namespace and
- Annotations that apply a term from the `org.example.hcm` namespace to an element of the `com.contoso.Person` namespace and specify a `Tablet` qualifier.

3.5.1 Attribute `TermNamespace`

An ~~edmx:IncludeAnnotations~~ `edmx:IncludeAnnotations` element MUST provide a `Namespace` value for the `TermNamespace` attribute. ~~A term namespace is a string that disambiguates terms with the same name.~~

~~For instance, assume both `org.schema` and `org.microformats` define a term named `Address`. Although the terms have the same name, they are uniquely identifiable since each term is in a model with a unique namespace.~~

~~If a value is supplied, the~~ The include element will import the set of annotations that apply ~~terms from~~ terms defined in the schema identified by the namespace in the value. The term namespace attribute also provides consumers insight about what namespaces are used in the annotations document. If there are no ~~include~~ `edmx:IncludeAnnotations` elements that have a term namespace of interest to the consumer, the consumer can opt ~~to~~ not to download the document.

3.5.2 Attribute `Qualifier`

An ~~edmx:IncludeAnnotations~~ `edmx:IncludeAnnotations` element MAY specify a ~~SimpleIdentifier~~ `SimpleIdentifier` for the `Qualifier` attribute. A qualifier is used to apply an annotation to a subset of consumers. For instance, a service author might want to supply a different set of annotations for various device form factors.

If `Qualifier` is specified, only those annotations ~~in~~ applying terms from the specified ~~TermNamespace~~ `TermNamespace` with the specified `Qualifier` (applied to an element of the `TargetNamespace`, if present) SHOULD be ~~applied~~ imported. If `Qualifier` is not specified, all annotations within the referenced document from the specified `TermNamespace` (taking into account the `TargetNamespace`, if present) SHOULD be imported.

The `Qualifier` attribute also provides consumers insight about what qualifiers are used in the annotations document. If the consumer is not interested in that particular qualifier, the consumer can opt not to download the document.

3.5.3 Attribute `TargetNamespace`

An `edmx:IncludeAnnotations` element MAY specify a `Namespace` value for the `TargetNamespace` attribute.

If `TargetNamespace` is specified, only those annotations which apply a term from the specified `TermNamespace` to an element of the `TargetNamespace` (with the specified `Qualifier`, if present) SHOULD be imported. If `TargetNamespace` is not specified, all annotations within the referenced document from the specified `TermNamespace` (taking into account the `Qualifier`, if present) SHOULD be imported.

The `TargetNamespace` attribute also provides consumers insight about what namespaces are used in the annotations document. If there are no target elements that have a namespace ~~SHOULD be applied.~~ of interest to the consumer, the consumer can opt not to download the document.

4 Common Characteristics of Entity Models

4.1 Nominal Types

A nominal type has a name. ~~The name that~~ MUST be a ~~SimpleIdentifier~~ SimpleIdentifier. ~~Prefixed with a Namespace and a dot (.) this produces a fully qualified name of the form~~ Nominal types are referenced using their QualifiedName. The qualified type name MUST be unique within a model as it facilitates references to the element from other parts of the model.

When referring to nominal types, the reference MUST use one of the following:

- ~~Namespace~~ Namespace-qualified name
- ~~Alias~~ Alias-qualified name

~~Consider the following example:~~

Example 5:

```
<Schema
  xmlns="http://docs.oasis-open.org/odata/ns/edm"
  Namespace="org.example"
  Alias="sales">
  <ComplexType Name="Address">...</ComplexType>
</Schema>
```

The ~~various~~ two ways of referring to the nominal type Address are:

- ~~References in any namespace can use the fully qualified name, for example,~~ org.example.Address can be used in any namespace
- ~~References an alias could be specified in any namespace can specify an alias and use~~ used in an alias-qualified name, for example, e.g. sales.Address

4.2 Structured Types

Structured types are composed of other model elements. Structured types are common in entity models as the means of representing entities and structured properties in an OData service. ~~Entity types~~ Entity types and ~~complex types~~ complex types are both structured types.

4.3 Structural Properties

A ~~structural property~~ structural property is a property (of a structural type) that has one of the following types:

- ~~Primitive type~~
- ~~Complex type~~
- ~~Enumeration type~~
- ~~A collection~~ Primitive type
- Complex type
- Enumeration type
- A collection of one of the above

4.4 Primitive Types

Structured types are composed of other structured types and primitive types. ~~CSDL~~ OData defines the following ~~fully-qualified~~ primitive types:

Type	Meaning
Edm.Binary	Fixed-length or variable-length binary data
Edm.Boolean	Binary-valued logic
Edm.Byte	Unsigned 8-bit integer
Edm.Date	Date without a time-zone offset
Edm.DateTimeOffset	Date and time with a time-zone offset, no leap seconds
Edm.Decimal	Numeric values with fixed precision and scale
Edm.Double	Floating-point number with 15 digits precision
Edm.Duration	Signed duration in days, hours, minutes, and (sub)seconds
Edm.Guid	16-byte (128-bit) unique identifier
Edm.Int16	Signed 16-bit integer
Edm.Int32	Signed 32-bit integer
Edm.Int64	Signed 64-bit integer
Edm.SByte	Signed 8-bit integer
Edm.Single	Floating-point number with 7 digits precision
Edm.Stream	Fixed-length or variable-length data stream
Edm.String	Fixed-length or variable-length sequence of UTF-8 characters
Edm.TimeOfDay	Clock time 0-23:59:59.999999999999
Edm.Geography	Abstract base type for all Geography types
Edm.GeographyPoint	A point in a round-earth coordinate system
Edm.GeographyLineString	Line string in a round-earth coordinate system
Edm.GeographyPolygon	Polygon in a round-earth coordinate system
Edm.GeographyMultiPoint	Collection of points in a round-earth coordinate system
Edm.GeographyMultiLineString	Collection of line strings in a round-earth coordinate system
Edm.GeographyMultiPolygon	Collection of polygons in a round-earth coordinate system
Edm.GeographyCollection	Collection of arbitrary Geography values
Edm.Geometry	Abstract base type for all Geometry types
Edm.GeometryPoint	Point in a flat-earth coordinate system
Edm.GeometryLineString	Line string in a flat-earth coordinate system
Edm.GeometryPolygon	Polygon in a flat-earth coordinate system
Edm.GeometryMultiPoint	Collection of points in a flat-earth coordinate system
Edm.GeometryMultiLineString	Collection of line strings in a flat-earth coordinate system
Edm.GeometryMultiPolygon	Collection of polygons in a flat-earth coordinate system

Type	Meaning
Edm.GeometryCollection	Collection of arbitrary Geometry values

Edm.Date and Edm.DateTimeOffset follow [XML-Schema-2] and use the proleptic Gregorian calendar, allowing the year 0000 and negative years.

Some of these types allow ~~facet attributes. These are~~ facet attributes, defined in section 6.2.

See [OData-ABNF] for the representation of primitive type values in URLs, and [OData-Atom] and [OData-JSON] for the representation in requests and responses.

4.5 Built-In Abstract Types

The following built-in abstract types can be used within a model:

- Edm.PrimitiveType
- Edm.ComplexType
- Edm.EntityType

Conceptually, these are the abstract base types for primitive types, (including type definitions and enumeration types), complex types, and entity types, respectively, and can be used anywhere a corresponding concrete type can be used, except:

- Edm.EntityType
 - cannot be used as the type of a ~~named-entity~~ singleton in an entity container because it doesn't define a structure, which defeats the purpose of a ~~named-entity~~ singleton.
 - cannot be used as the type of an entity set because all entities in an entity set must have the same key fields to uniquely identify them within the set.
 - cannot be the base type of an entity type or complex type.
- Edm.ComplexType
 - cannot be the base type of an entity type or complex type.
- Edm.PrimitiveType
 - cannot be used as the type of a key property of an entity type.
 - cannot be used as the underlying type of a type definition or enumeration type.
- Collection(Edm.PrimitiveType) and Collection(Edm.ComplexType)
 - cannot be used as the type of a property.
 - ~~Cannot~~cannot be used as the return type of a function.

~~Vocabulary terms~~Vocabulary terms can, in addition, use

- Edm.AnnotationPath
- Edm.PropertyPath
- Edm.NavigationPropertyPath

as the type of a primitive term, or the type of a property of a complex type that is exclusively used as the type of a term.

4.6 Annotations

Many parts of the model can be annotated with additional information ~~with~~using the ~~edm:Annotation~~edm:Annotation element.

A model element MUST NOT specify more than one annotation for a given ~~value~~combination of the Term and Qualifier attributes.

Vocabulary annotations can be specified as a child of the model element [being annotated](#) or as a child of an ~~edm:Annotations~~[edm:Annotations](#) element that targets the model element.

~~Refer to Vocabulary Annotations~~[Refer to Vocabulary Annotations](#) for details on which model elements support vocabulary annotations.

5 Schema

One or more schemas describe the entity model exposed by an OData service. The schema acts as a ~~container~~namespace for ~~allelements~~of the entity model such as entity types, complex types, enumerations and ~~other parts of the entity model~~terms.

5.1 Element `edm:Schema`

The `edm:Schema` ~~is the root of an entity model exposed by an OData service. Although an `edm:DataService` element can contain more than one `Schema` elements, most OData services will contain exactly one schema.~~

~~An `edm:Schema` element contains~~ zero~~one~~ or more of the following elements:

- ~~• `edm:Action`~~
- ~~• `edm:Annotations`~~
- ~~• `edm:ComplexType`~~
- ~~• `edm:EntityContainer`~~
- ~~• `edm:EntityType`~~
- ~~• `edm:EnumType`~~
- ~~• `edm:Function`~~
- ~~• `edm:Term`~~
- ~~• `edm:TypeDefinition`~~
- `edm:Action`
- `edm:Annotations`
- `edm:Annotation`
- `edm:ComplexType`
- `edm:EntityContainer`
- `edm:EntityType`
- `edm:EnumType`
- `edm:Function`
- `edm:Term`
- `edm:TypeDefinition`

Values of the `Name` attribute MUST be unique across all direct child elements of a schema, with the sole exception of ~~action~~-overloads for an action and ~~function~~-overloads for a function. The names are local to the schema; they need not be unique within a document.

5.1.1 Attribute `Namespace`

A schema is identified by a `Namespace`. All `edm:Schema` elements MUST have a `Namespace` defined through a `Namespace` attribute which MUST be unique within the document, and SHOULD be globally unique. A schema cannot span more than one document.

The schema's namespace is combined with the name of elements in the entity model to create unique ~~qualified names~~qualified names, so identifiers that are used to name types MUST be unique within a namespace to prevent ambiguity. ~~See `Nominal Types`~~See `Nominal Types` for more detail.

The `Namespace` attribute MUST NOT use the reserved values `Edm`, `odata`, `System`, or `Transient`.

5.1.2 Attribute `Alias`

A schema MAY define an alias by providing a ~~SimpleIdentifier~~SimpleIdentifier value for the `Alias` attribute. An alias allows nominal types to be qualified with a short string rather than a long namespace.

Aliases are document-global, so all ~~edmx:Include and edm:Schema~~edmx:Include and edm:Schema elements within a document MUST specify different values for the `Alias` attribute. Aliases defined by an ~~edm:Schema~~edm:Schema element can be used throughout the containing document and are not restricted to the schema that defines them.

The `Alias` attribute MUST NOT use the reserved values `Edm`, `odata`, `System`, or `Transient`.

6 Structural Property

Structured Types **Structured Types** are composed of zero or more structural properties (represented as `edm:Property` elements) and navigation properties (represented as `edm:NavigationProperty` elements).

For example, the following **Example 6**: complex type *haswith* two properties:

```
<ComplexType Name="Measurement">
  <Property Name="Dimension" Type="Edm.String" Nullable="false" MaxLength="50"
    DefaultValue="Unspecified"/>
</>
  <Property Name="Length" Type="Edm.Decimal" Nullable="false" Precision="18"
    Scale="2" />
</ComplexType>
```

Open entity types **Open entity types and open complex types** allow properties to be added dynamically. When requesting the value to instances of a missing property from an **open entity** type, the instance **MUST** return a representation of the null value.

6.1 Element `edm:Property`

An **edm:Property** element allows the construction of structured types from structural properties—defines a structural property.

For instance, the following **Example 7**: property *could be used to hold* that can have zero or more strings representing the names of measurement units: as its value

```
<Property Name="Units" Type="Collection(Edm.String)" Nullable="false"/>
```

A property **MUST** specify a unique **name** as well as a type and zero or more facets. **Facets** are attributes that modify or constrain the acceptable values for a property value.

6.1.1 Attribute Name

A property **The `edm:Property` element** **MUST** specify include a **SimpleIdentifier** value for the `Name` attribute. The name attribute allows a name to be assigned to the property. This name—whose value is a **SimpleIdentifier** used when referencing, serializing or deserializing **OData** payloads and can be used for other purposes, such as code generation the property.

The name of the **structural** property **MUST** be unique within the set of structural and navigation properties of the containing **structured type** and any of its base types.

6.1.2 Attribute Type

A property **The `edm:Property` element** **MUST** specify include a value for the `Type` attribute. The value of this attribute determines the type for the value of the property on instances of the containing type.

The value of the `Type` attribute **MUST** be the **QualifiedName** of a **primitive type**, **complex type**, or **enumeration type** in scope, or a collection of one of these types.

6.2 Property Facets

Property facets allow a model to provide additional constraints or data about the value of structural properties. Facets are expressed as attributes on the property element.

Facets apply to the type referenced in the element where the facet is declared. If the type is a collection ~~type-declared-with-attribute-notation~~, the facets apply to the ~~type~~ type of elements in the collection. ~~In the following example, the Precision facet applies to the DateTimeOffset type.~~

Example 8: Precision facet applied to the DateTimeOffset type

```
<Property Name="SuggestedTimes" Type="Collection(Edm.DateTimeOffset)"
  Precision="6" />
```

6.2.1 Attribute Nullable

~~Any property~~ The edm:Property element MAY define a ~~contain the~~ Nullable attribute whose Boolean value ~~for the Nullable facet attribute. The value of this attribute determines~~ specifies whether a value is required for the property ~~on instances of the containing type.~~

If no value is specified for a property whose Type attribute does not specify a collection, the Nullable facet attribute defaults to true.

A property whose Type attribute specifies a collection MUST NOT specify a value for the Nullable attribute as the collection always exists, it may just be empty.

6.2.2 Attribute MaxLength

A binary, stream or string property MAY define a positive integer value for the MaxLength facet attribute. The value of this attribute specifies the maximum length of the value of the property on a type instance. Instead of an integer value the constant `max` MAY be specified as a shorthand for the maximum length supported for the type by the ~~server~~ service.

If no value is specified, the property has unspecified length.

6.2.3 Attribute Precision

A datetimeoffset, decimal, duration, or ~~timeofday~~ time-of-day property MAY define a value for the Precision attribute.

For a decimal property the value of this attribute specifies the maximum number of digits allowed in the property's value; it MUST be a positive integer. If no value is specified, the decimal property has unspecified precision.

For a temporal property the value of this attribute specifies the number of decimal places allowed in the seconds portion of the property's value; it MUST be a non-negative integer between zero and twelve. If no value is specified, the temporal property has a precision of zero.

Note: service designers SHOULD be aware that some clients are unable to support a precision greater than 29 for decimal properties and 7 for temporal properties. Client developers MUST be aware of the potential for data loss when round-tripping values of greater precision. Updating via `PATCH` and exclusively specifying modified properties will reduce the risk for unintended data loss.

6.2.4 Attribute Scale

A decimal property MAY define a non-negative integer value or variable for the Scale attribute. ~~The integer value of this~~ This attribute specifies the maximum number of digits allowed to the right of the decimal point. The value variable means that the number of digits to the right of the decimal point may vary from zero to the value of the ~~Precision~~ Precision attribute.

The value of the Scale attribute MUST be less than or equal to the value of the ~~Precision~~ Precision attribute.

If no value is specified, the Scale facet defaults to zero.

6.2.5 Attribute Unicode

A string property MAY define a Boolean value for the `Unicode` attribute.

A `true` value assigned to this attribute indicates that the value of the property is encoded with Unicode. A `false` value assigned to this attribute indicates that the value of the property is encoded with ASCII.

If no value is specified, the `Unicode` facet defaults to `true`.

6.2.6 Attribute SRID

A geometry or geography property MAY define a value for the `SRID` attribute. The value of this attribute identifies which spatial reference system is applied to values of the property on type instances.

The value of the `SRID` attribute MUST be a non-negative integer or the special value `variable`. If no value is specified, the attribute defaults to 0 for `Geometry` types or 4326 for `Geography` types.

The valid values of the `SRID` attribute and their meanings are as defined by the European Petroleum Survey Group [EPSG].

6.2.7 Attribute DefaultValue

A primitive or enumeration property MAY define a value for the `DefaultValue` attribute. The value of this attribute determines the value of the property if the property is not explicitly represented in an annotation, the body of a `POST` or `PUT` request, or the URL of a function invocation.

Default values MUST be represented according to the `xxxBodyxxxValue` rule defined in [OData-ABNF] that is appropriate for the type of the property.

If no value is specified, the `DefaultValue` attribute defaults to `null`.

7 Navigation Property

7.1 Element `edm:NavigationProperty`

A navigation property allows navigation to related entities.

In the following example, [Example 9](#), the `Product` entity type has a navigation property to a `Category`, which has a navigation link back to one or more products:

```
<EntityType Name="Product">
  ...
  <NavigationProperty Name="Category" Type="Self.Category" Nullable="false"
    Partner="Products" />
  <NavigationProperty Name="Supplier" Type="Self.Supplier" />
</EntityType>

<EntityType Name="Category">
  ...
  <NavigationProperty Name="Products" Type="Collection(Self.Product)"
    Partner="Category" />
</EntityType>
```

7.1.1 Attribute Name

The `navigation-property` `edm:NavigationProperty` element MUST ~~provide~~include a `SimpleIdentifier` value for the `Name` attribute. ~~The name attribute whose value is a meaningful string~~`SimpleIdentifier` that ~~characterizes the relationship~~is used when navigating from the ~~structured type~~`structured type` that declares the navigation property to the related entity type.

The name of the navigation property MUST be unique within the set of structural and navigation properties of the containing ~~structured type~~`structured type` and any of its base types.

7.1.2 Attribute Type

~~A navigation property~~The `edm:NavigationProperty` element MUST ~~specify~~include a value for the `Type` attribute. The value of the type attribute MUST resolve to an ~~entity type~~`entity type` or a collection of an entity type ~~in scope, i.e. either~~declared in the same document or a document referenced with an ~~edm:Reference~~`edm:Reference` element, ~~or the abstract type~~`Edm.EntityType`.

If the value is an entity type name, there can be at most one related entity. If it is a collection, an arbitrary number of entities can be related.

The related entities MUST be of the specified entity type or one of its subtypes.

7.1.3 Attribute Nullable

~~A navigation property~~The `edm:Property` element MAY contain the `Nullable` attribute whose `Type` attribute ~~does not specify a collection~~~~MAY specify~~a Boolean value ~~for the Nullable attribute~~. ~~The value of this attribute determines~~`specifies` whether a navigation target is required for the navigation property ~~on instances of the containing type.~~

If no value is specified for a navigation property whose `Type` attribute does not specify a collection, the `Nullable` attribute defaults to `true`. The value `true` (or the absence of the `Nullable` attribute) indicates that no navigation target is required. The value `false` indicates that a navigation target is required for the navigation property on instances of the containing type.

A navigation property whose `Type` attribute specifies a collection MUST NOT specify a value for the `Nullable` attribute as the collection always exists, it may just be empty.

7.1.4 Attribute `Partner`

A navigation property of an ~~entity type~~ `entity type` MAY specify a ~~SimpleIdentifier~~ `navigation property path` value for the `Partner` attribute.

This attribute MUST NOT be specified for navigation properties of complex types.

~~If specified, the value of this attribute MUST be the name of a direct or inherited navigation property in a path from the entity type specified in the `Type` attribute to a navigation property defined on that type or a derived type. The path may traverse complex types, including derived complex types, but MUST NOT traverse any navigation properties.~~ The type of the partner navigation property MUST be the containing entity type of the current navigation property or one of its parent entity types.

If the `Partner` attribute identifies a single-valued navigation property, the partner navigation property MUST lead back to the source entity from all related entities. If the `Partner` attribute identifies a multi-valued navigation property, the source entity MUST be part of that collection.

If no partner navigation property is specified, no assumptions can be made as to whether one of the navigation properties on the target type will lead back to the source entity.

If a partner navigation property is specified, this partner navigation property MUST either specify the current navigation property as its partner to define a bi-directional relationship or it MUST NOT specify a partner attribute. The latter can occur if the partner navigation property is defined on a complex type or the current navigation property is defined on a type derived from the type of the partner navigation property.

~~This attribute MUST NOT be specified for navigation properties of complex types.~~

7.1.5 Attribute `ContainsTarget`

A navigation property ~~of an entity type~~ MAY assign a Boolean value to the `ContainsTarget` attribute. If no value is assigned to the `ContainsTarget` attribute, the attribute defaults to `false`. If the value ~~assigned to~~ of the `ContainsTarget` attribute is `true`, ~~entities of the entity type that specifies the navigation property contain the entities referenced by the~~ `navigation property` is called a *containment navigation property*.

#Containment navigation properties define an implicit entity set for each instance of its declaring entity type. This implicit entity set is identified by the read URL of the navigation property for that entity.

Entities of the entity type that declares the navigation property, either directly or indirectly via a property of complex type, contain the entities referenced by the containment navigation property. The canonical URL for contained entities is the canonical URL of the containing entity, followed by the path segment of the navigation property and the key of the contained entity, see [OData-URL].

As items in a collection of complex type do not have a canonical URL, complex types declaring a containment navigation property, either directly or indirectly via a property of complex type, MUST NOT be possible-for-an-used as the type of a collection-valued property.

An entity ~~type to contain itself~~ cannot be referenced by ~~following~~ more than one containment ~~navigation property~~ relationship, and cannot both belong to an entity set declared within the entity container and be referenced by a containment relationship.

Containment navigation properties MUST NOT be specified as the last path segment in the `Path` attribute of a navigation property binding.

When a *containment navigation property* ~~with `ContainsTarget="true"`~~ navigates between entity types in the same ~~entity set inheritance hierarchy~~, the containment is called *recursive containment*.

Containment navigation properties MAY specify a `Partner` attribute. If the containment is recursive, the partner navigation property MUST be nullable and specify a single entity type (i.e. have a multiplicity of 0..1). If the containment is not recursive, the partner navigation property MUST NOT be nullable (i.e. have a multiplicity of 1).

If the containment is recursive, a navigation property binding for the containment navigation property MUST specify the same entity set that encloses the navigation property binding.

An entity cannot be contained by type hierarchy MUST NOT contain more than one entity, so an entity set MUST NOT be specified in the EntitySet navigation property with a Partner attribute of referencing a navigation property binding containment relationship.

Note: without a partner attribute, there is no reliable way for a client to determine which entity contains a given contained entity. This may lead to problems for more than one clients if the contained navigation property can also be reached via a non-containment navigation property path.

7.2 Element edm:ReferentialConstraint

A navigation property whose Type attribute specifies a single entity type MAY define a referential constraint. A referential constraint asserts that if the navigation property is not null, the property of the dependent entity (the source of the navigation) listed in the referential constraint MUST have the same value as the referenced property of the principal entity (the target of the navigation).

In the example that follows, Example 10, the category must exist for a product in that category to exist, and the category ID of the product is identical to the ID of the category:

```
<EntityType Name="Product">
  ...
  <NavigationProperty Name="Category" Type="Self.Category" Nullable="false">
    <ReferentialConstraint Property="CategoryID" ReferencedProperty="ID" />
    <OnDelete Action="Cascade" />
  </NavigationProperty>
</EntityType>
```

7.2.1 Attribute Property

A referential constraint MUST specify a value for the Property attribute. The Property attribute specifies the property that takes part in the referential constraint on the dependent entity type. Its value MUST be a path expression resolving to a primitive property of the dependent entity type itself or to a primitive property of a complex property (recursively) of the dependent entity type. The names of the properties in the path are joined together by forward slashes.

7.2.2 Attribute ReferencedProperty

A referential constraint MUST specify a value for the ReferencedProperty attribute. The ReferencedProperty attribute specifies the corresponding property of the principal entity type. Its value MUST be a path expression resolving to a primitive property of the principal entity type itself or to a primitive property of a complex property (recursively) of the principal entity type that MUST have the same data type as the property of the dependent entity type.

7.3 Element edm:OnDelete

A navigation property MAY define an edm:OnDelete element. It prescribes describes the action that should be taken the service will take on related entities when the (last) source entity targeted by the navigation property is deleted.

7.3.1 If present, the Attribute Action

The edm:OnDelete element MUST define a value for include the Action attribute. The value assigned to the action attribute MUST be with one of the following values:

- Cascade, meaning the dependent related entities will be deleted if the principal source entity is deleted,

- None, meaning a DELETE ~~operation request~~ on a ~~principal~~source entity with ~~dependent~~related entities will fail,
- SetNull, meaning all ~~dependent~~ properties of related entities that are tied to properties of the source entity via a referential constraint and that do not participate in other referential constraints will be set to null,
- SetDefault, meaning all ~~dependent properties~~ properties of related entities that are tied to properties of the source entity via a referential constraint and that do not participate in other referential constraints will be set to their default value.

If no `edm:OnDelete` element is present, the action taken by the service is not predictable by the client and ~~MAY~~could vary per entity.

8 Entity Type

Entity types are ~~nominal structured types~~ nominal structured types with a key that consists of one or more references to ~~structural properties~~ structural properties. An entity type is the template for an entity: any uniquely identifiable record such as a customer or order.

~~A key MUST~~ An edm:Key child element MAY be ~~supplied if and only specified~~ if the entity type does not specify a ~~base type~~ base type that already has a key declared. The key consists of one or more references to structural properties of the entity type.

An entity type can define two types of properties. A ~~structural property~~ structural property is a named reference to a primitive, complex, or enumeration type, or a collection of primitive, complex, or enumeration types. ~~A navigation property~~ A navigation property is a named reference to another entity type or collection of entity types. ~~All properties MUST have a unique name within an entity type. Properties MUST NOT have the same name as the declaring entity type.~~

~~An open entity type~~ All properties MUST have a unique name within an entity type. Properties MUST NOT have the same name as the declaring entity type. They MAY have the same name as one of the direct or indirect base types or derived types.

~~An open entity type~~ allows properties to be added to an instance of the type dynamically. Any request for the value added to instances of a missing property on an open entity type MUST return null the type.

Example 11: a simple example of an entity type is as follows:

```
<EntityType Name="Product"
Employee">
  <Key>
    <PropertyRef Name="ID"/>
  </Key>
  <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
  <Property Name="Name" Type="Edm.String" Nullable="true"/>
  <Property Name="Description" Type="Edm.String" Nullable="true"/>
  <Property Name="LastName" Type="Edm.String" Nullable="false"/>
  <NavigationProperty Name="CategoryManager" Type="Self.Category"/>
  <NavigationProperty Name="Supplier" Type="Self.Supplier"/>Model.Manager" />
</EntityType>
```

The following example shows an Example 12: a derived entity type based on the previous example:

```
<EntityType Name="DiscontinuedProductManager" BaseType="Self.Product">
Model.Employee">
  <Property Name="DiscontinuedDate" Type="Edm.DateTimeOffset"
  Nullable="true"/>Decimal" />
  <NavigationProperty Name="Employees" Type="Collection (Model.Employee)" />
</EntityType>
```

Note: the derived type has the same name as one of the properties of its base type.

8.1 Element edm:EntityType

The edm:EntityType element represents an entity type in the entity model. ~~It MAY contain zero or more edm:Property elements and zero or more edm:NavigationProperty elements~~ It contains zero or more edm:Property and edm:NavigationProperty elements describing the properties of the entity type.

~~It also MAY~~ contain one ~~edm:Key~~ edm:Key element.

8.1.1 Attribute Name

~~An entity type~~The `edm:EntityType` element MUST ~~provide~~include a `SimpleIdentifier` value for the Name attribute ~~because it~~whose value is a ~~nominal type~~. The value identifies the entity type ~~and~~SimpleIdentifier. The name MUST be unique within its namespace.

8.1.2 Attribute BaseType

An entity type can inherit from another entity type by specifying the ~~QualifiedName~~Qualified Name of the base entity type as the value for the `BaseType` attribute.

An entity type inherits the ~~key~~key as well as structural and navigation properties declared on the entity type's base type.

An entity type MUST NOT introduce an inheritance cycle via the base type attribute.

8.1.3 Attribute Abstract

An entity type MAY indicate that it cannot be instantiated by providing a Boolean value of `true` to the `Abstract` attribute. If not specified, the `Abstract` attribute defaults to `false`.

If `Abstract` is `false`, the entity type MUST define a key or derive from a base type with a defined key.

An abstract entity type MUST NOT inherit from a non-abstract entity type.

8.1.4 Attribute OpenType

An entity type MAY indicate that it is open by providing a value of `true` for the `OpenType` attribute. An open type allows clients to add properties dynamically to instances of the type by specifying uniquely named values in the payload used to insert or update an instance of the type.

If not specified, the value of the `OpenType` attribute defaults to `false`.

An entity type derived from an open entity type MUST NOT provide a value of `false` for the `OpenType` attribute.

Note: structural and navigation properties MAY be returned by the service on instances of any structured type, whether or not the type is marked as open. Clients MUST always be prepared to deal with additional properties on instances of any structured type, see [\[\[OData-Protocol\]\]](#).

8.1.5 Attribute HasStream

An entity type MAY specify a Boolean value for the `HasStream` attribute.

A value of `true` specifies that the entity type is a media entity. *Media entities* are entities that represent a media stream, such as a photo. For more information on media entities see [\[\[OData-Protocol\]\]](#).

If no value is provided for the `HasStream` attribute, the value of the `HasStream` attribute is set to `false`.

Entity types that specify `HasStream="true"` MAY specify a list of acceptable media types using an annotation with term `Core.AcceptableMediaTypes`, see [\[\[OData-VocCore\]\]](#).

8.2 Element `edm:Key`

An entity is uniquely identified within an entity set by its key. An entity type that is not ~~abstract~~abstract MUST either contain exactly one `edm:Key` element or inherit its key from its ~~base type~~base type. An abstract entity type MAY define a key if it doesn't inherit one.

An entity type's key refers to the set of properties that uniquely identify an instance of the entity type within an entity set. ~~If specified, the key MUST contain one or more `edm:PropertyRef` elements. An `edm:PropertyRef` element references an `edm:Property`. The properties that compose the key MUST be non-nullable and typed with an enumeration type, one of the following primitive types, or a type definition based on one of these primitive types:~~

The `edm:Key` element MUST contain at least one `edm:PropertyRef` element. An `edm:PropertyRef` element references an `edm:Property`. The properties that compose the key MUST be non-nullable and typed with an enumeration type, one of the following primitive types, or a type definition based on one of these primitive types:

- `Edm.Boolean`
- `Edm.Byte`
- `Edm.Date`
- `Edm.DateTimeOffset`
- `Edm.Decimal`
- `Edm.Duration`
- ~~`Edm.GeographyPoint`~~
- ~~`Edm.GeometryPoint`~~
- `Edm.Guid`
- `Edm.Int16`
- `Edm.Int32`
- `Edm.Int64`
- `Edm.SByte`
- `Edm.String`
- `Edm.TimeOfDay`

The following [Example 13](#): entity type *has with* a simple key:

```
<EntityType Name="Category">
  <Key>
    <PropertyRef Name="ID"/>
  </Key>
  <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
  <Property Name="Name" Type="Edm.String" Nullable="true"/>
</EntityType>
```

The following [Example 14](#): entity type *has with* a simple key referencing a property of a complex type:

```
<EntityType Name="Category">
  <Key>
    <PropertyRef Name="Info/ID" Alias="EntryInfoID"/>
  </Key>
  <Property Name="Info" Type="Sales.EntryInfoEntityInfo" Nullable="false"/>
  <Property Name="Name" Type="Edm.String" Nullable="true"/>
</EntityType>

<ComplexType Name="EntryInfoEntityInfo">
  <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
  <Property Name="Created" Type="Edm.DateTimeOffset"/>
</ComplexType>
```

The following [Example 15](#): entity type *has with* a composite key:

```

<EntityType Name="OrderLine">
  <Key>
    <PropertyRef Name="OrderID"/>
  </Key>
  <Property Name="OrderID" Type="Edm.Int32" Nullable="false"/>
  <Property Name="LineNumber" Type="Edm.Int32" Nullable="false"/>
</EntityType>

```

8.3 Element `edm:PropertyRef`

The `edm:PropertyRef` element provides an `edm:Key` with a reference to a property.

8.3.1 Attribute Name

The `edm:PropertyRef` element MUST specify a value for the `Name` attribute which MUST be a path expression resolving to a primitive property of the entity type itself or to a primitive property of a complex property (recursively) of the entity type. The names of the properties in the path are joined together by forward slashes.

8.3.2 Attribute Alias

The `edm:PropertyRef` element MAY define a `SimpleIdentifier` value for the `Alias` attribute.

The `Alias` attribute defines an alias for the property identified by the `Name` attribute. The alias MUST be unique within the set of aliases, structural and navigation properties of the containing entity type and any of its base types.

An alias MUST be defined if the key property is a member of a complex type.

If an alias is defined, it MUST be used in the key predicate of URLs instead of the value assigned to the `Name` attribute. The alias MUST NOT be used in the query part.

Based Example 16 (based on the example above 14): requests to an entity set `Categories` of type `Category` can be sent: must use the alias

```
http://host/service/Categories(EntryInfoIDEntityInfoID=1)
```

~~The alias MUST NOT be used in the query part, e.g. in filter expressions.~~

Example 17 (based on example 14): in a query part the value assigned to the name attribute must be used

```
http://example.org/OData.svc/Categories?$filter=Info/ID le 100
```

9 Complex Type

Complex types are keyless ~~nominal structured types~~ nominal structured types. The lack of a key means that complex types cannot be referenced, created, updated or deleted independently of an entity type. Complex types allow entity models to group properties into common structures ~~if the group of properties does not need to be managed independently~~.

A complex type can define two types of properties. A structural property is a named reference to a primitive, complex, or enumeration type, or a collection of primitive, complex, or enumeration types. A navigation property is a named reference to an entity type or a collection of entity types.

All properties MUST have a unique name ~~within a complex type~~. Properties MUST NOT have the same name as the declaring complex type. They MAY have the same name as one of the direct or indirect base types or derived types.

~~The following example demonstrates~~ An open complex type allows properties to be dynamically added to instances of the type.

Example 18: a complex type ~~that is~~ used by two entity types:

```
<ComplexType Name="Dimensions">
  <Property Name="Height" Nullable="false" Type="Edm.Decimal"/>
</ComplexType>

<EntityType Name="Product">
  ...
  <Property Name="ProductDimensions" Type="Self.Dimensions"/>
  <Property Name="ShippingDimensions" Type="Self.Dimensions"/>
</EntityType>

<EntityType Name="ShipmentBox">
  ...
  <Property Name="Dimensions" Type="Self.Dimensions"/>
</EntityType>
```

9.1 Element `edm:ComplexType`

The `edm:ComplexType` element represents a complex type in an entity model. It contains zero or more `edm:Property` and `edm:NavigationProperty` elements describing properties of the complex type.

9.1.1 ~~If no base type is specified, the~~ Attribute Name

The `edm:ComplexType` element MUST contain one or more `edm:Property` elements describing the properties of the complex type.

~~If include a base type is specified, the `edm:ComplexType` element MAY contain zero or more `edm:Property` elements describing additional properties of the derived complex type.~~

~~9.1.11.1.1 Attribute Name~~

~~A complex type MUST provide a SimpleIdentifier value for the Name attribute because it is a nominal type whose value is a SimpleIdentifier.~~ The value identifies the complex type and MUST be unique within its namespace.

9.1.2 Attribute BaseType

A complex type can inherit from another complex type by specifying the ~~QualifiedName~~QualifiedName of the base complex type as the value for the `BaseType` attribute.

A complex type inherits the properties declared on the complex type's base type.

A complex type MUST NOT introduce an inheritance cycle via the base type attribute.

9.1.3 Attribute Abstract

A complex type MAY indicate that it cannot be instantiated by providing a Boolean value of `true` to the `Abstract` attribute.

If not specified, the `Abstract` attribute defaults to `false`.

9.1.4 Attribute OpenType

A complex type MAY indicate that it is open by providing a value of `true` for the `OpenType` attribute. An open type allows clients to add properties dynamically to instances of the type by specifying uniquely named values in the payload used to insert or update an instance of the type.

If not specified, the `OpenType` attribute defaults to `false`.

A complex type derived from an open complex type MUST NOT provide a value of `false` for the `OpenType` attribute.

Note: structural and navigation properties MAY be returned by the service on instances of any structured type, whether or not the type is marked as open. Clients MUST always be prepared to deal with additional properties on instances of any structured type, see [\[OData-Protocol\]](#).

10 Enumeration Type

Enumeration types are ~~nominal~~nominal scalar types that represent a series of related values. Enumeration types expose these related values as members of the enumeration.

~~Enumeration types typically allow the selection of a single member.~~ The ~~IsFlag~~IsFlags attribute allows entity model authors to indicate indicates that more than one ~~value can~~member may be selected at a time.

The following example shows Example 19: a simple flags-enabled ~~enum~~enumeration

```
<EnumType Name="FileAccess" UnderlyingType="Edm.Int32" IsFlags="true">
  <Member Name="Read" Value="1"/>
</EnumType>
<Member Name="Write" Value="2"/>
</EnumType>
<Member Name="Create" Value="4"/>
</EnumType>
<Member Name="Delete" Value="8"/>
</EnumType>
```

10.1 Element `edm:EnumType`

The `edm:EnumType` element represents an enumeration type in an entity model.

10.1.1 Attribute Name

~~An enumeration type~~The `edm:EnumType` element MUST ~~provide~~include a ~~SimpleIdentifier value for the~~SimpleIdentifier Name attribute ~~because it~~whose value is a ~~nominal type~~nominal type. The value identifies the enumeration type and MUST be unique within its namespace.

The enumeration type element contains ~~zero~~one or more child ~~edm:Member~~edm:Member elements defining the members of the enumeration type.

10.1.2 Attribute `UnderlyingType`

~~An enumeration type has an underlying type which specifies the allowable values for member mapping.~~

An enumeration type MAY include an `UnderlyingType` attribute to specify an underlying type whose value MUST be one of `Edm.Byte`, `Edm.SByte`, `Edm.Int16`, `Edm.Int32`, or `Edm.Int64`. If the `UnderlyingType` attribute is not specified, ~~a 32-bit integer MUST be~~`Edm.Int32` is used as the underlying type.

10.1.3 Attribute `IsFlags`

An enumeration type MAY specify a Boolean value for the `IsFlags` attribute. A value of `true` indicates that the enumeration type allows multiple members to be selected simultaneously.

If no value is specified for this attribute, its value defaults to `false`.

10.2 Element `edm:Member`

~~An enumeration type typically has two or more members. Members represent~~The `edm:Member` element defines the discrete options for the enumeration type.

~~Enumeration members are declared~~Example 20: an enumeration type with the `edm:Member` element.

~~For example, the following enumeration type has three discrete members:~~

```

<EnumType Name="ShippingMethod">
  <Member Name="FirstClass"/>
  <Member Name="TwoDay"/>
  <Member Name="Overnight"/>
</EnumType>

```

10.2.1 Attribute Name

Each **enumeration member** `edm:Member` element MUST **provide** a **SimpleIdentifier** value for the **Name** attribute, **whose value is a SimpleIdentifier**. The enumeration type MUST NOT declare two members with the same name.

10.2.2 Attribute Value

The value of an enumeration member allows **entity** instances to be sorted by a property that has an enumeration member for its value.

If the **IsFlags** attribute has a value of **false** **and the**, **either all members MUST specify an integer value for the Value attribute** **is not explicitly set, the value MUST be**, **or all members MUST NOT specify a value for the Value attribute**. If no values are specified, the members are assigned **to** **0** **consecutive integer values in the order of their appearance, starting with zero for the first member** **or one plus the previous member value for any subsequent members**. **Client libraries MUST preserve elements in document order**.

If the **IsFlags** attribute has a value of **true**, **the Value attribute MUST be explicitly set, and it MUST be assigned a non-negative number** **integer value MUST be specified for the Value attribute**. A combined value is equivalent to the bitwise OR of the discrete values.

The value MUST be a valid value for the **UnderlyingType** of the enumeration type.

*In the example that follows, **Example 21**: **FirstClass** MUST be assigned has a value of 0, **TwoDay** a value of **4**, and **Overnight** a value of **5**.*

```

<EnumType Name="ShippingMethod">
  <Member Name="FirstClass"/>
  <Member Name="TwoDay" Value="4"/>
  <Member Name="Overnight"/>
</EnumType>

```

*In the next example **Example 22**: pattern values can be combined, and some combined values have explicit names:*

```

<EnumType Name="Pattern" UnderlyingType="Edm.Int32" IsFlags="true">
  <Member Name="Plain" Value="0"/>
  <Member Name="Red" Value="1"/>
  <Member Name="Blue" Value="2"/>
  <Member Name="Yellow" Value="4"/>
  <Member Name="Solid" Value="8"/>
  <Member Name="Striped" Value="16"/>
  <Member Name="SolidRed" Value="9"/>
  <Member Name="SolidBlue" Value="10"/>
  <Member Name="SolidYellow" Value="12"/>
  <Member Name="RedBlueStriped" Value="19"/>
  <Member Name="RedYellowStriped" Value="21"/>
  <Member Name="BlueYellowStriped" Value="22"/>
</EnumType>

```

11 Type Definition

11.1 Element `edm:TypeDefinition`

A type definition defines a specialization of one of the ~~primitive types~~primitive types.

Type definitions can be used wherever a primitive type is used (other than as the underlying type in a new type definition), and are type-comparable with their underlying types and any type definitions defined using the same underlying type.

11.1.1 Attribute Name

~~A type definition~~The `edm:TypeDefinition` element MUST ~~provide~~include a SimpleIdentifier value for the `Name` attribute ~~because it~~whose value is a nominal type. ~~The value~~SimpleIdentifier. The name identifies the type definition and MUST be unique within its namespace.

11.1.2 Attribute UnderlyingType

The `edm:TypeDefinition` element MUST provide the QualifiedName~~QualifiedName~~ of a primitive type~~primitive type~~ as the value of the `UnderlyingType` attribute. ~~#This type MUST NOT provide the name of a~~be another type definition ~~as the value of the~~UnderlyingType attribute.

11.1.3 Type Definition Facets

The `edm:TypeDefinition` element MAY specify ~~values for zero or more~~ facets applicable to the underlying type: ~~MaxLength~~MaxLength, Unicode, Precision, ~~Unicode~~, ~~Precision~~, Scale~~Scale~~, or SRID~~SRID~~.

Additional facets appropriate for the underlying type MAY be specified when the type definition is used but the facets specified in the type definition MUST NOT be re-specified.

Annotations MAY be applied to a type definition, and are considered applied wherever the type definition is used. Applying the same annotation to a property whose type definition already defines that annotation is an error.

Where type definitions are used, the type definition is returned in place of the primitive type wherever the type is specified in a response.

Example 23:

```
<TypeDefinition Name="Length" UnderlyingType="Edm.Int32">
  <Annotation Term="Org.OData.OData.Measurements.V1.Unit"
    String="Centimeters"/>
</TypeDefinition>

<TypeDefinition Name="Weight" UnderlyingType="Edm.Int32">
  <Annotation Term="Org.OData.OData.Measurements.V1.Unit"
    String="Kilograms"/>
</TypeDefinition>

<ComplexType Name="Size">
  <Property Name="Height" Type="Self.Length"/>
  <Property Name="Weight" Type="Self.Weight"/>
</ComplexType>
```

12 Action and Function

12.1 Element `edm:Action`

The `edm:Action` element ~~is a nominal type that~~ represents an Action action in an entity model.

Actions MAY have observable side- effects and MAY return a single instance or a collection of instances of any type. Actions are not composable.

The action MAY specify a return type using the ~~`edm:ReturnType` element~~. `edm:ReturnType` element. The return type must be a scalar, entity or complex type, or a collection of scalar, entity or complex types.

The action may also define zero or more ~~`edm:Parameter`~~ `edm:Parameter` elements to be used during the execution of the action.

12.1.1 Attribute Name

~~A bindable~~ The `edm:Action` element MUST include a `Name` attribute whose value is a `SimpleIdentifier`. An action MAY have overloads, that is multiple `edm:Action` elements in a schema MAY specify the same value for the `Name` attribute. ~~The combination of the action name and the binding parameter type MUST identify the action overload.~~

12.1.1 Attribute ~~Name~~

An action ~~MUST provide a `SimpleIdentifier` value for the `Name` attribute.~~ For ~~non-bindable actions the name MUST be unique within its namespace.~~ For bindable actions bound overloads, the combination of the action name and the binding parameter type MUST be unique within its namespace. For unbound overloads, the name MUST be unique within its namespace and MAY be identical to the name of a bound overload.

12.1.2 Attribute ReturnType

~~If the~~ The return type is written with attribute notation, a `TypeName` value MUST be provided for of the function may be specified through the `ReturnType` attribute.

~~If a value is provided for on the `ReturnType`~~ `edm:Action` element or through a child `edm:ReturnType` element.

If specified through the `ReturnType` attribute, the value of the attribute, is the `TypeName` of the return type and the `edm:Action` element MUST NOT contain an ~~`edm:ReturnType`~~ `edm:ReturnType` element.

12.1.3 Attribute ~~IsBindable~~ IsBound

An action element MAY specify a Boolean value for the ~~`IsBindable`~~ `IsBound` attribute. If no value is specified for the ~~`IsBindable`~~ `IsBound` attribute, the value defaults to `false`.

If the value of the ~~`IsBindable`~~ `IsBound` attribute is set to `true`, the action element MUST contain at least one ~~`edm:Parameter`~~ `edm:Parameter` element, and the first parameter is the binding parameter. It MAY be of any type, and it MAY be ~~nullable~~ nullable.

12.1.4 Attribute EntitySetPath

~~Bindable actions MAY specify a value for the `EntitySetPath` attribute if determination of the entity set for the return type is contingent on the binding parameter.~~

~~The value for the EntitySetPath attribute consists of a series of segments joined together with forward slashes.~~

~~The first segment of the entity set path MUST be the name of the binding parameter. The remaining segments of the entity set path MUST represent navigation segments or type casts.~~

~~Bound actions that return an entity or a collection of entities MAY specify a value for the EntitySetPath attribute if determination of the entity set for the return type is contingent on the binding parameter.~~

The value for the EntitySetPath attribute consists of a series of segments joined together with forward slashes.

The first segment of the entity set path MUST be the name of the binding parameter. The remaining segments of the entity set path MUST represent navigation segments or type casts.

A navigation segment names the ~~SimpleIdentifier~~SimpleIdentifier of the ~~navigation-property~~navigation property to be traversed. A type cast segment names the ~~QualifiedName~~QualifiedName of the entity type that should be returned from the type cast.

12.2 Element edm:Function

The edm:Function element ~~is a nominal type that~~ represents a ~~Function~~function in an entity model.

Functions MUST NOT have observable side-effects and MUST return a single instance or a collection of instances of any type. Functions MAY be composable.

The function ~~MAY~~MUST specify a return type using ~~either the ReturnType attribute or the edm:ReturnType~~edm:ReturnType element. The return type must be a scalar, entity or complex type, or a collection of scalar, entity or complex types.

The function may also define zero or more ~~edm:Parameter~~edm:Parameter elements to be used during the execution of the function.

12.2.1 Attribute Name

~~The edm:Function element MUST include a Name attribute whose value is a SimpleIdentifier. A function MAY have overloads, that is multiple edm:Function elements in a schema MAY specify the same value for the Name attribute. The combination of the function name and the unordered list of parameter names and types MUST identify a particular function overload. In addition a function MUST NOT have overloads that differ only in the "type family" of a parameter. Type families are~~

- ~~• Integer: Edm.SByte, Edm.Byte, Edm.Int16, Edm.Int32, Edm.Int64, Edm.Decimal with Scale equal to zero~~
- ~~• Float: Edm.Single, Edm.Double, Edm.Decimal with Scale not equal to zero.~~

Attribute Name

12.2.1 Attribute Name

~~A function MUST provide a SimpleIdentifier value for~~For unbound overloads the Name attribute. ~~The combination of the function name and the unordered list~~set of parameter names ~~and types~~MUST identify a particular function overload.

~~All unbound overloads MUST be unique within its namespace.~~have the same return type.

~~For bound overloads the combination of the function name, the binding parameter type, and the unordered set of names of the non-binding parameters MUST identify a particular function overload.~~

~~All bound overloads with a given binding parameter type MUST have the same return type.~~

12.2.2 Attribute `ReturnType`

~~If the~~The return type ~~is written with attribute notation, a TypeName value MUST~~of the function may be ~~provided for~~specified through the `ReturnType` attribute on the `edm:Action` element or through a child `edm:ReturnType` element.

If specified through the `ReturnType` attribute-

~~If a value is provided for,~~ the value of the attribute is the `TypeName` of the return type ~~attribute,~~and the `edm:FunctionAction` element MUST NOT contain an ~~edm:ReturnType~~`edm:ReturnType` element.

12.2.3 Attribute `IsBindable``IsBound`

A function element MAY specify a Boolean value for the `IsBindable``IsBound` attribute. If no value is specified for the `IsBindable``IsBound` attribute, the value defaults to false.

If the value of the `IsBindable``IsBound` attribute is set to true, the function element MUST contain at least one ~~edm:Parameter~~`edm:Parameter` element, and the first parameter is the binding parameter. It may be of any type-, and it MAY be nullable.

12.2.4 Attribute `IsComposable`

A function element can specify a Boolean value for the `IsComposable` attribute. If no value is specified for the `IsComposable` attribute, the value defaults to false.

12.2.5 Attribute `EntitySetPath`

Bound functions that return an entity or a collection of entities MAY specify a value for the `EntitySetPath` attribute if determination of the entity set for the return type is contingent on the binding parameter.

The value for the `EntitySetPath` attribute consists of a series of segments joined together with forward slashes.

The first segment of the entity set path MUST be the name of the binding parameter. The remaining segments of the entity set path MUST represent navigation segments or type casts.

~~Bindable functions MAY specify a value for the `EntitySetPath` attribute if determination of the entity set for the return type is contingent on the binding parameter.~~

~~The value for the `EntitySetPath` attribute consists of a series of segments joined together with forward slashes.~~

~~The first segment of the entity set path MUST be the name of the binding parameter. The remaining segments of the entity set path MUST represent navigation segments or type casts.~~

A navigation segment names the ~~SimpleIdentifier~~`SimpleIdentifier` of the ~~navigation property~~`navigation property` to be traversed. A type cast segment names the ~~QualifiedName~~`QualifiedName` of the entity type that should be returned from the type cast.

12.3 Element `edm:ReturnType`

~~If the return type is written with an~~ `edm:Action` or `edm:Function` element ~~notation, the function element does not include the~~ `ReturnType` attribute, it MUST contain a single `edm:ReturnType` element.

~~If element notation is used, the facet~~The attributes ~~MaxLength~~`MaxLength`, ~~Precision~~`Precision`, ~~Scale~~`Scale`, and ~~SRID~~`SRID` can be used to specify the ~~return type~~`facets` of the ~~function~~`return type`, as appropriate. If the facet attributes are not specified, their values are considered unspecified.

12.3.1 Attribute Type

The `Type` attribute corresponds to the ~~ReturnType~~Return Type attribute of the function ~~element~~or action.

12.3.2 Attribute Nullable

A return type whose `Type` attribute does not specify a collection MAY specify a Boolean value for the `Nullable` attribute. If not specified, the `Nullable` attribute defaults to `true`.

The value of `true` means that the action or function may return a single `null` value. A value of `false` means that the action or function will never return a `null` value and instead fail with an error response if it cannot compute a result.

A return type whose `Type` attribute specifies a collection MUST NOT specify a value for the `Nullable` attribute as the returned collection cannot be `null`, it may just be empty.

12.4 Element `edm:Parameter`

The `edm:Parameter` element allows one or more parameters to be passed to ~~the~~a function. ~~This enables the-~~ or action.

Example 24: a function ~~to return a dynamic set of instances—for example,~~ returning the top-selling products ~~by~~ for a given year. In this case the year must be specified as a parameter ~~to~~ of the function with the `edm:Parameter` element.

```
<Function Name="TopSellingProducts" ReturnType="Collection(Model.Product)">
  <Parameter Name="Year" Type="Edm.Decimal" Precision="4" Scale="0" />
</Function>
```

12.4.1 Attribute Name

~~A parameter~~The `edm:Parameter` element MUST ~~provide a SimpleIdentifier value for the~~include a `Name` attribute ~~whose value is a SimpleIdentifier~~. The parameter name MUST be unique within its parent element.

12.4.2 Attribute Type

~~A parameter~~The `edm:Parameter` element MUST ~~indicate which set~~include the `Type` attribute whose value is a `TypeName` indicating the type of ~~types~~value that can be passed to the parameter ~~by providing a~~ `TypeName`.

12.4.3 Attribute Nullable

A parameter whose `Type` attribute does not specify a collection MAY specify a Boolean value for the ~~Type attribute~~`Nullable` attribute. If not specified, the `Nullable` attribute defaults to `true`.

The value of `true` means that the parameter accepts a `null` value.

~~12.4.3~~12.4.4 Parameter Facets

~~An `edm:Parameter` element MAY specify values for the `Nullable`, `DefaultValue`, `MaxLength`, `Precision`, `Scale`, or `SRID` attributes.~~An `edm:Parameter` element MAY specify values for the `MaxLength`, `Precision`, `Scale`, or `SRID` attributes. The descriptions of these facets and their implications are covered in section 6.2.

13 Entity Container

~~An entity model can also~~ Each metadata document used to describe ~~how entities are logically grouped and even model the store or stores from which the entities can be retrieved. This is achieved through the declaration of entity~~ an OData service MUST define exactly one entity container. Entity containers ~~and define the~~ entity sets, singletons, function and action imports exposed by the service.

~~An entity set is a nominal type that~~ An *entity set* allows access to entity type instances. Simple entity models frequently have one entity set per entity type, ~~for example:~~

Example 25: one entity set per entity type

```
<EntitySet Name="Products" EntityType="Self.Product"/>
<EntitySet Name="Categories" EntityType="Self.Category"/>
```

Other entity models may expose multiple entity sets per type. ~~For instance, an entity model may have the following~~

Example 26: three entity sets: referring to the two entity types

```
<EntitySet Name="ProductsStandardCustomers" EntityType="Self.Product"/>
Customer">
  <NavigationPropertyBinding Path="Orders" Target="Orders" />
</EntitySet>
<EntitySet Name="DiscontinuedProductsPreferredCustomers"
EntityType="Self.Product"/>Customer">
In this case the Products entity set could expose products that have not been discontinued and the DiscontinuedProducts entity set could expose products that have been discontinued. Note that an entity
  <NavigationPropertyBinding
Path="Orders" Target="Orders" />
</EntitySet>
<EntitySet Name="Orders" EntityType="Self.Order" />
```

There are separate entity sets for standard customers and preferred customers, but only one entity set for orders. The entity sets for standard customers and preferred customers both have navigation property bindings to the orders entity set, but the orders entity set does not have a navigation property binding for the Customer navigation property, since it could lead to either set of customers.

Note: although a model may expose multiple entity sets of the same type, an entity can be a member of at most one entity set, see **[OData-Protocol]**.

An entity set can expose instances of the specified entity type as well as any entity type inherited from the specified entity type.

A ~~named entity~~ *singleton* allows addressing a single entity directly from the entity container without having to know its key. ~~This allows defining a shortcut to "important" entities, and without requiring an entity set.~~

A function import or having "singleton" entities without the need for a one-element entity set.

~~A function import~~ an *action import* is used to expose ~~functions that are a function or action defined in a data store. For example, the following function import exposes an entity model as a stored procedure that returns~~ top level resource.

Example 27: function import returning the top ten revenue-generating products for a given fiscal year:

```
<FunctionImport Name="TopTenProductsByRevenueTopSellingProducts"
Function="Self.TopTenProductsByRevenueModel.TopSellingProducts"
EntityType="Products"/>
```

Example 28: An entity container aggregates entity sets, ~~root entities, and function singletons, action imports, and function imports.~~

~~A full example of an entity container is as follows:~~


```

<EntityContainer Name="DemoService">
  <EntitySet Name="Products" EntityType="Self.Product">
    <NavigationPropertyBinding Path="Category"
      EntitySet
      Target="Self.DemoService.Categories"/>
    <NavigationPropertyBinding Path="Supplier"
      EntitySet
      Target="Self.DemoService.Suppliers"/>
  </EntitySet>
  <EntitySet Name="Categories" EntityType="Self.Category">
    <NavigationPropertyBinding Path="Products"
      EntitySet
      Target="Self.DemoService.Products"/>
  </EntitySet>
  <EntitySet Name="Suppliers" EntityType="Self.Supplier">
    <NavigationPropertyBinding Path="Products"
      EntitySet
      Target="Self.DemoService.Products"/>
  </EntitySet>
  <Singleton Name="Contoso" Type="Self.Supplier"/>
  <ActionImport Name="LeaveRequestApproval" Function="Self.Approval" />
  <FunctionImport Name="ProductsByRating" Function="Self.ProductsByRating"
    EntitySet="Products" />
</EntityContainer>

```

13.1 Element edm:EntityContainer

The edm:EntityContainer element represents an entity container in an entity model. It corresponds to a logical/virtual or physical data store and contains zero or more edm:EntitySet, edm:EntitySingleton, ~~edm:ActionImport~~ edm:ActionImport, or edm:FunctionImport elements. Action Entity set, singleton, action import, and function import, ~~entity set, and entity~~ names MUST be unique within an entity container.-

13.1.1 Attribute Name

The ~~entity container~~ edm:EntityContainer element MUST provide a unique ~~SimpleIdentifier~~ SimpleIdentifier value for the Name attribute.

13.1.2 Attribute IsDefaultEntityContainer

~~The entity container MAY provide a Boolean value for the IsDefaultEntityContainer attribute. Each metadata document that is used to describe an OData service MUST mark exactly one entity container with this attribute to denote that it is the default.~~

~~If no value is specified for this attribute, its value defaults to false.~~

13.1.3 13.1.2 Attribute Extends

~~An entity container~~ The edm:EntityContainer element MAY ~~provide a QualifiedName value for the include~~ an Extends attribute. ~~The whose value provided to is the Extends attribute MUST resolve to QualifiedName of an entity container in scope.~~ All children of the “base” entity container specified in the Extends attribute are added to the “extending” entity container that has the Extends attribute.

Example:

```

29: the <EntityContainer Name="Extending" Extends="SomeOtherSchema.Base">
...

```

```
</EntityContainer>
```

~~The~~ entity container *Extending* will contain all child elements that it defines itself, plus all child elements of the *Base* entity container located in *SomeOtherSchema*.

```
<EntityContainer Name="Extending" Extends="SomeOtherSchema.Base">
  ...
</EntityContainer>
```

13.2 Element `edm:EntitySet`

The `edm:EntitySet` element ~~is a nominal type that~~ represents an entity set in an entity model.

13.2.1 Attribute Name

~~An entity set~~The `edm:EntitySet` element MUST ~~provide a SimpleIdentifier value for the~~ include a `Name` attribute, ~~whose value is a SimpleIdentifier.~~

13.2.2 Attribute `EntityType`

~~An entity set also has~~The `edm:EntitySet` element MUST include an `EntityType` attribute ~~that MUST be provided with~~whose value is the `QualifiedName` of an ~~entity type~~entity type in scope. Each entity type in the model may have zero or more entity sets that reference the entity type.

An entity set MUST contain only instances of the entity type specified by the `EntityType` attribute or its subtypes. The entity type named by the ~~entity type~~`EntityType` attribute MAY be ~~abstract~~abstract but MUST have a key defined.

13.2.3 Attribute `IncludeInServiceDocument`

~~An entity set~~The `edm:EntitySet` element MAY ~~provide a Boolean value for~~include the `IncludeInServiceDocument` attribute. ~~Its~~whose Boolean value indicates whether the entity set is advertised in the service document.

If no value is specified for this attribute, its value defaults to `true`.

Entity sets that cannot be queried without specifying ~~e.g. a \$filter~~additional query ~~option~~options SHOULD specify the value `false` for this attribute.

13.3 Element `edm:Singleton`

The `edm:Singleton` element represents a single entity in an entity model, called a *singleton*.

13.3.1 Attribute Name

The `edm:Singleton` element MUST include a `Name` attribute whose value is a `SimpleIdentifier`.

13.3.2 Attribute `Type`

The `edm:Singleton` element MUST include a `Type` attribute whose value is the `QualifiedName` of an entity type in scope. Each entity type in the model may be used in zero or more `edm:Singleton` elements.

A singleton MUST reference an instance of the entity type specified by the `Type` attribute.

~~13.3~~13.4 Element `edm:NavigationPropertyBinding`

An ~~entity set~~entity set or a singleton SHOULD contain an `edm:NavigationPropertyBinding` element for each ~~navigation property~~navigation property of its entity type ~~and each complex type used in its~~, including navigation properties ~~defined on complex typed properties~~.

If omitted, clients MUST assume that the target entity set or singleton can vary per related entity.

13.4.1 Attribute `Path`

~~13.3.11.1.1~~ Attribute `Path`

A navigation property binding MUST name a navigation property of the entity set's ~~or singleton's~~ entity type or one of its subtypes in the `Path` attribute. If the navigation property is defined on a subtype, the path attribute MUST contain the ~~QualifiedName~~QualifiedName of the entity type, followed by a forward slash, followed by the navigation property name. If the navigation property is defined on a complex type used in the definition of the entity set's entity type, the path attribute MUST contain a forward-slash separated list of complex property names and qualified type names that describe the path leading to the navigation property.

A navigation property MUST NOT be named in more than one navigation property binding; navigation property bindings are only used when all related entities are known to come from a single entity set.

~~13.3.2~~13.2 Attribute `EntitySetTarget`

A navigation property binding MUST specify a `SimpleIdentifier` or `TargetPath` value for the ~~EntitySetTarget~~EntitySetTarget attribute. ~~The value MUST be the name of that names~~the entity set that contains the related instances targeted by the navigation property specified in the ~~PathPath~~Path attribute, ~~or the name of a singleton~~. If ~~the target entity set~~a `SimpleIdentifier` is ~~not specified~~, it MUST resolve to an entity set or singleton defined in the same entity container as the enclosing `EntitySet` element, ~~the entity set name~~. If a `TargetPath` is specified, it MUST ~~be qualified with the namespace or alias of the schema that defines the entity set, followed by the entity container~~resolve to an entity set or singleton in scope.

Examples:

- ~~EntitySet="SomeSet"~~Example 30: for an entity set in the same container as the enclosing entity set, `Categories`

```
<EntitySet "SomeModel.SomeContainer" Name="Categories"
  EntityType="Self.Category">
  <NavigationPropertyBinding Path="Products"
    Target="SomeSet" />
</EntitySet>
```

- Example 31: for an entity set in any container in scope.

```
<EntitySet Name="Categories" EntityType="Self.Category">
  <NavigationPropertyBinding Path="Products"
```

13.4 Element `edm:Entity`

The `edm:Entity` element represents a single entity in an entity model.

13.4.1 Attribute `Name`

A named entity MUST provide a `SimpleIdentifier` value for the `Name` attribute.

13.4.2 Attribute Type

A named entity also has a `Type` attribute that MUST be provided with the `QualifiedName` of an entity type in scope. Each entity type in the model may have zero or more named entities that reference the entity type.

A named entity MUST reference an instance of the entity type specified by the `Type` attribute or its subtypes. The entity type named by the `Type` attribute MAY be abstract.

```
Target="SomeModel.SomeContainer/SomeSet" />  
</EntitySet>
```

13.5 Element `edm:ActionImport`

The `edm:ActionImport` element allows exposing an `Action` unbound action as a top-level element in an entity container ~~or bind the action result to a specific entity set.~~ Action imports are never advertised in the service document.

13.5.1 Attribute Name

~~An action import~~ The `edm:ActionImport` element MUST ~~provide a SimpleIdentifier value for the~~ include a Name attribute, whose value is a SimpleIdentifier. It MAY be identical to the last ~~SimpleIdentifier~~ segment of the ~~Action~~ SimpleIdentifier used to specify the Action attribute value.

13.5.2 Attribute Action

~~An action import MUST provide a QualifiedName~~ The `edm:ActionImport` element MUST include a QualifiedName value for the Action attribute which MUST resolve to the name of an ~~edm:Action~~ unbound edm:Action element in scope.

13.5.3 Attribute EntitySet

If the return type of the action specified in the ~~Action~~ Action attribute is an entity or a collection of entities, a ~~SimpleIdentifier~~ SimpleIdentifier or ~~QualifiedName~~ TargetPath value MAY be ~~defined~~ specified for the `EntitySet` attribute that names the entity set to which the returned entities belong. ~~If a SimpleIdentifier~~ If a SimpleIdentifier is specified, it MUST resolve to an entity set defined in the same entity container. ~~If a QualifiedName~~ If a TargetPath is specified, it MUST resolve to an entity set in scope.

If the return type is not an entity or a collection of entities, a value MUST NOT be defined for the `EntitySet` attribute.

~~If the EntitySet attribute is assigned a value, it overrides the EntitySetPath attribute of the action specified in the Action attribute.~~

13.6 Element `edm:FunctionImport`

The `edm:FunctionImport` element allows exposing ~~a~~ an unbound ~~Function~~ function as a top-level element in an entity container ~~or bind the function result to a specific entity set.~~

13.6.1 Attribute Name

~~A function import~~ The `edm:FunctionImport` element MUST ~~provide a SimpleIdentifier value for the~~ include a Name attribute, whose value is a SimpleIdentifier. It MAY be identical to the last segment of the ~~SimpleIdentifier~~ segment of the Function used to specify the Function attribute value.

13.6.2 Attribute Function

~~A function import~~The `edm:FunctionImport` element MUST ~~provide a QualifiedName value for~~include the `Function` attribute ~~whose value~~ MUST ~~resolve~~be a `QualifiedName` that resolves to the name of an ~~`edm:Function`~~`unbound edm:Function` element in scope.

13.6.3 Attribute EntitySet

If the return type of the function specified in the ~~`Function`~~`Function` attribute is an entity or a collection of entities, a ~~`SimpleIdentifier`~~`SimpleIdentifier` or ~~`QualifiedName`~~`TargetPath` value MAY be defined for the `EntitySet` attribute that names the entity set to which the returned entities belong. ~~If a `SimpleIdentifier`~~If a `SimpleIdentifier` is specified, it MUST resolve to an entity set defined in the same entity container. ~~If a `QualifiedName`~~If a `TargetPath` is specified, it MUST resolve to an entity set in scope.

If the return type is not an entity or a collection of entities, a value MUST NOT be defined for the `EntitySet` attribute.

~~If the `EntitySet` attribute is assigned a value, it overrides the `EntitySetPath` attribute of the function specified in the `Function` attribute.~~

13.6.4 Attribute IncludeInServiceDocument

~~A function import~~The `edm:FunctionImport` for a parameterless function MAY ~~provide a Boolean value for~~include the `IncludeInServiceDocument` attribute. ~~Its~~ whose Boolean value indicates whether the function import is advertised in the service document.

If no value is specified for this attribute, its value defaults to `false`.

14 Vocabulary and Annotation

The concept of “Vocabularies and Annotations” provides annotations provide the ability to annotate metadata as well as instance data, and define a powerful extensibility point for OData. An annotation attaches annotation applies a term-term to a model element and provides a means of calculating defines how to calculate a value for the applied term.

Metadata annotations can be used to define additional characteristics or capabilities of a metadata element, such as a service, entity type, property, function, action or parameter. For example, a metadata annotation may define ranges of valid values for a particular property. Metadata annotations are applied in CSDL documents describing or referencing an entity model.

Instance annotations can be used to define additional information associated with a particular result, entity, property, or error; for example, whether a property is read-only for a particular instance. Where the same annotation is defined at both the metadata and instance level, the instance-level annotation should override overrides the annotation specified at the metadata level. Instance annotations appear in the actual payload as described in [OData-Atom] and [OData-JSON]. Annotations that apply across instances should be specified as metadata annotations.

A vocabulary is a namespace containing a set of terms where each term-term is a named metadata extension. Anyone can define a vocabulary (a set of terms) that is scenario-specific or company-specific; more commonly used terms can be published as shared vocabularies such as the OData core Core vocabulary. [OData-VocCore].

An annotated A term-term can be used for two fundamental purposes:

- To extend model elements and type instances with additional information.
- To map instances of annotated entity structured types to an interface; the interface is defined by the term type.

A service SHOULD NOT require a client to interpret; i.e. annotations.

Example: extend an entity type with a DisplayName by a metadata annotation that binds the term DisplayName to the value of the property Name:

```
<EntityType Name="Category">
...
<Property Name="Name" Nullable="true" Type="Edm.String"/>
<Annotation Term="UI.DisplayName" Path="Name"/>
</EntityType>
```

- Annotations also allow viewing instances of a structured type as instances of a differently structured type specified by the applied term. For instance, the following Product entity type

A service SHOULD NOT require a client to interpret annotations.

Example 32: the Product entity type is extended with a DisplayName by a metadata annotation that binds the term DisplayName to the value of the property Name. The Product entity type also includes an annotation that allows its instances to be viewed as instances of the type specified by the term SearchResult. For instance, the following Product entity type includes an annotation that allows its instances to be viewed as instances of the complex type SearchResult:

```
<EntityType Name="Product">
  <Key>

    <PropertyRef Name="ID"/>
  " />
```

```

</Key>
<Property Name="ID" Nullable="false" Type="Edm.Int32"/>
"/>
<Property Name="Name" Nullable="true" Type="Edm.String"/>
"/>
<Property Name="Description" Nullable="true" Type="Edm.String" />
<Property Name="ReleaseDate" Nullable="false" Type="Edm.DateTimeOffset"/>
<Property Name="Rating" Nullable="false" Type="Edm.Int32"/>
<Property Name="Price" Nullable="false" Type="Edm.Decimal"/>
...
...
<Annotation Term="UI.DisplayName" Path="Name" />
<Annotation Term="SearchVocabulary.SearchResult">
  <PropertyValue Property="Title" Path="Name"/>
"/>
<PropertyValue Property="Abstract" Path="Description" />
<PropertyValue Property="Url">
  <Apply Function="odata.concat">
    <String>Products</String>
    <Path>ID</Path>
    <String></String>
  </Apply>
</PropertyValue>
<PropertyValue Property="Abstract">
  <Path>Description</Path>
</PropertyValue>
</Annotation>
</EntityType>

```

14.1 Element **edm:Term**

The **edm:Term** element defines a term in a vocabulary.

A term ~~is defined to annotate~~ allows annotating a CSDL element or OData resource representation with additional data. A term has a value that MAY be of primitive type, enumeration type, complex type, entity type, or a collection of these types.

14.1.1 Attribute Name

The **edm:Term** element MUST ~~provide a SimpleIdentifier value for the~~ include a Name attribute. ~~The Name attribute allows the term to be applied with an annotation, whose value is a SimpleIdentifier.~~

14.1.2 Attribute Type

The **edm:Term** element MUST ~~provide a TypeName value for the~~ include a Type attribute. ~~The Type attribute whose value is a TypeName. It indicates what type of value must be returned by the expression contained in the an annotation using the term.~~

14.1.3 Attribute DefaultValue

A **edm:Term** element of primitive or enumeration type MAY define a value for the **DefaultValue** attribute. The value of this attribute determines the value of the term when applied in an **edm:Annotation** without providing an expression.

Default values MUST be represented according to the **xxxBodyxxxValue** rule defined in [OData-ABNF] that is appropriate for the type of the **property term**.

If no value is specified, the **DefaultValue** attribute defaults to null.

14.1.4 Attribute AppliesTo

AThe `edm:Term` element MAY define a value for the `AppliesTo` attribute. The value of this attribute is a whitespace-separated list of CSDL element names that this term can be applied to. If no value is supplied, the term is not restricted in its application.

Example:

Example 33: the `IsURI` term can be applied to properties and terms that are of type `Edm.String` (the `Core.Tag` type and the two `Core` terms are defined in `[OData-VocCore]`)

```
<Term Name="IsURI" Type="Core.Tag"Term DefaultValue="true"
  AppliesTo="Property">
  <Annotation Term="Core.Description">
    <String>
      Properties and terms annotated with this term MUST contain a valid URI
    </String>
  </Annotation>
  <Annotation Term="Core.RequiresType" String="Edm.String"/> />
</Term>
```

~~The `IsURI` term can be applied to properties and terms that are of type `Edm.String`.~~

14.1.5 Term Facets

AThe `edm:Term` element MAY specify values for the `Nullable`, `DefaultValue`, `MaxLength`, `Precision`, `Scale`, or `SRID` attributes. ~~The descriptions of these~~ These facets and their implications are ~~covered~~ described in section 6.2.

14.2 Element `edm:Annotations`

The `edm:Annotations` element is used to apply a group of annotations to a single model element. It MUST contain at least one `edm:Annotation` element.

14.2.1 Attribute Target

AThe `edm:Annotations` element MUST ~~assign~~ include a ~~path expression to the~~ `Target` attribute. ~~The~~ whose value of the `Target` attribute is a `TargetPath` that MUST resolve to a model element in the entity model.

~~An annotations element contains zero or more `edm:Annotation` elements.~~

External targeting is only possible for EDM elements that are uniquely identified within their parent, and all their ancestor elements are uniquely identified within their parent:

- | | |
|---|--|
| • <u><code>edm:ActionImport</code></u> | • <u><code>edm:Member</code></u> |
| • <u><code>edm:ComplexType</code></u> | • <u><code>edm:NavigationProperty</code></u> |
| • <u><code>edm:EntityContainer</code></u> | • <u><code>edm:Property</code></u> |
| • <u><code>edm:EntitySet</code></u> | • <u><code>edm:Singleton</code></u> |
| • <u><code>edm:EntityType</code></u> | • <u><code>edm:Term</code></u> |
| • <u><code>edm:EnumType</code></u> | • <u><code>edm:TypeDefinition</code></u> |
| • <u><code>edm:FunctionImport</code></u> | |

These are the direct children of a schema with a unique name (i.e. except actions and functions whose overloads do not possess a natural identifier), and all direct children of an entity container. Most of the not uniquely identifiable EDM elements can still be annotated using a nested `edm:Annotation` element.

The allowed path expressions are:

- QualifiedName of schema child
- QualifiedName of schema child followed by a forward slash and name of child element

Example 34: Target expressions

```
Schema.Type  
Schema.EntityType/Property  
Schema.ComplexType/NavigationProperty  
Schema.EnumType/Member  
Schema.EntityContainer  
Schema.EntityContainer/EntitySet
```

14.2.2 Attribute Qualifier

An `edm:Annotations` element MAY provide a ~~SimpleIdentifier~~SimpleIdentifier value for the `Qualifier` attribute.

The `Qualifier` attribute allows annotation authors a means of conditionally applying an annotation. ~~For instance, the following annotation hints that it should only be applied to tablet devices:~~

Example 35: annotations should only be applied to tablet devices

```
<Annotations Target="Self.Person" Qualifier="Tablet">  
  ...  
</Annotations>
```

14.3 Element `edm:Annotation`

The `edm:Annotation` element represents a single annotation. An ~~annotation attaches~~annotation applies a ~~term~~term to a model element and ~~provides a means of calculating~~defines how to calculate a value for the term application. The following model elements MAY be annotated with a term:

- ~~• edm:Action~~
- ~~• edm:ActionImport~~
- ~~• edm:Annotations~~
- ~~• edm:Apply~~
- ~~• edm:AssertType~~
- ~~• edm:Collection~~
- ~~• edm:ComplexType~~
- ~~• edm:Entity~~
- ~~• edm:EntityContainer~~
- ~~• edm:EntitySet~~
- ~~• edm:EntityType~~
- ~~• edm:EnumType~~
- ~~• edm:Function~~
- ~~• edm:FunctionImport~~
- ~~• edm:If~~
- ~~• edm:IsType~~
- ~~• edm:LabeledElement~~
- ~~• edm:Member~~

- ~~edm:NavigationProperty~~
- ~~edm:Null~~
- ~~edm:OnDelete~~
- ~~edm:Parameter~~
- ~~edm:Property~~
- ~~edm:PropertyValue~~
- ~~edm:Record~~
- ~~edm:ReferentialConstraint~~
- ~~edm:Schema~~
- ~~edm:Term~~
- ~~edm:TypeDefinition~~
- ~~edmx:Reference~~

- edm:Action
- edm:ActionImport
- edm:Annotation
- edm:Apply
- edm:Cast
- edm:ComplexType
- edm:EntityContainer
- edm:EntitySet
- edm:EntityType
- edm:EnumType
- edm:Function
- edm:FunctionImport
- edm:If
- edm:IsOf
- edm:LabeledElement
- edm:Member

- edm:NavigationProperty
- edm:Null
- edm:OnDelete
- edm:Parameter
- edm:Property
- edm:PropertyValue
- edm:Record
- edm:ReferentialConstraint
- edm:Schema
- edm:Singleton
- edm:Term
- edm:TypeDefinition
- edm:UrlRef
- edmx:Reference
- all Comparison and Logical Operators

An ~~annotation~~edm:Annotation element ~~MUST~~can be used as a child of the model element it annotates, or as ~~a~~the child of an ~~edm:Annotations~~edm:Annotations element that targets the ~~appropriate~~model element to be annotated.

An annotation element MAY contain a ~~constant expression~~constant expression or ~~dynamic expression~~dynamic expression in either attribute or element notation. If no expression is specified, the ~~default value~~default value of the term definition is used.

If an entity type or complex type is annotated with a term that itself has a structured type, an instance of the annotated type may be viewed as an “instance” of the term, and the qualified term ~~Name~~name may be used as a “term-cast” segment in ~~path expressions~~path expressions.

14.3.1 Attribute Term

An annotation element MUST provide a ~~QualifiedName~~QualifiedName value for the Term attribute. The value of the Term attribute MUST be the Name of a ~~Term~~Term definition in scope. The target of the annotation MUST comply with any ~~AppliesTo~~AppliesTo constraint.

14.3.2 Attribute Qualifier

An annotation element MAY provide a ~~SimpleIdentifier~~SimpleIdentifier value for the Qualifier attribute. The qualifier attribute allows annotation authors a means of conditionally applying an annotation.

Example: ~~The following 36:~~ annotation ~~hints that it should only be applied to tablet devices:~~

```
<Annotation Term="org.example.display.DisplayName" Path="FirstName"
  Qualifier="Tablet"/>
```

Annotation elements that are children of an ~~edm:Annotations~~edm:Annotations element MUST NOT provide a value for the qualifier attribute if the parent ~~edm:Annotations~~edm:Annotations element provides a value for the qualifier attribute.

14.4 Constant Expressions

~~Values for a term or properties of a term are obtained by calculating~~Constant expressions. ~~There are a variety of expressions that allow service authors to supply assigning a constant values. value to an applied term. The constant expressions support element and attribute notation.~~

The following examples show Example 37: two annotations intended as user interface hints:

```
<EntitySet Name="Products" EntityType="Self.Product">
  <Annotation Term="org.example.display.DisplayName"
    String="Product Catalog"/>
</EntitySet>

<EntitySet Name="Suppliers" EntityType="Self.Supplier">
  <Annotation Term="org.example.display.DisplayName">
    <String>Supplier Directory</String>
  </Annotation>
</EntitySet>
```

~~The constant expressions and the edm:NavigationPropertyPath, edm:Path, edm:PropertyPath, and edm:Url dynamic expressions also support attribute notation:~~

14.4.1 Expression edm:Binary

The edm:Binary expression evaluates to a primitive binary value. A binary expression MUST be assigned a value of type xs:hexBinary, see [XML-Schema-2], ~~section 3.2.15~~section 3.2.15.

The binary expression MAY be provided using element notation or attribute notation.

Example 38:

```
<Annotation Term="org.example.display.Thumbnail" Binary="3f3c6d78206c"/>

<Annotation Term="org.example.display.Thumbnail">
  <Binary>3f3c6d78206c</Binary>
</Annotation>
```

14.4.114.4.2 Expression edm:Bool

The `edm:Bool` expression evaluates to a primitive Boolean value. A Boolean expression MUST be assigned a Boolean value.

The ~~Boolean~~ Boolean expression MAY be provided using element notation or attribute notation.

Example 39:

```
<Annotation Term="org.example.display.ReadOnly" Bool="true" />

<Annotation Term="org.example.display.ReadOnly">
  <Bool>true</Bool>
</Annotation>
```

14.4.214.4.3 Expression edm:Date

The `edm:Date` expression evaluates to a primitive date value. A date expression MUST be assigned a value of type `xs:date`, see [XML-Schema-2], ~~section 3.3.9~~section 3.3.9. The value MUST NOT contain a time-zone offset.

The date expression MAY be provided using element notation or attribute notation.

Example 40:

```
<Annotation Term="org.example.vCard.birthday" Date="2000-01-01" />

<Annotation Term="org.example.vCard.birthday">
  <Date>2000-01-01</Date>
</Annotation>
```

14.4.314.4.4 Expression edm:DateTimeOffset

The `edm:DateTimeOffset` expression evaluates to a primitive date/time value with a time-zone offset. A date/time expression MUST be assigned a value of type `xs:dateTimeStamp`, see [XML-Schema-2], ~~section 3.4.28~~section 3.4.28. The value MUST NOT contain an end-of-day fragment (24:00:00).

The date/time expression MAY be provided using element notation or attribute notation.

Example 41:

```
<Annotation Term="org.example.display.LastUpdated"
  DateTimeOffset="2000-01-01T16:00:00.000Z" />

<Annotation Term="org.example.display.LastUpdated">
  <DateTimeOffset>2000-01-01T16:00:00.000-09:00</DateTimeOffset>
</Annotation>
```

14.4.414.4.5 Expression edm:Decimal

The `edm:Decimal` expression evaluates to a primitive decimal value. A decimal expression MUST be assigned a value of the type `xs:decimal`, see [XML-Schema-2], ~~section 3.2.3~~section 3.2.3.

The decimal expression MAY be provided using element notation or attribute notation.

Example 42:

```
<Annotation Term="org.example.display.Width" Decimal="3.14" />

<Annotation Term="org.example.display.Width">
  <Decimal>3.14</Decimal>
</Annotation>
```

14.4.514.4.6 Expression edm:Duration

The edm:Duration expression evaluates to a primitive duration value. A duration expression MUST be assigned a value of type xs:dayTimeDuration, see [XML-Schema-2], [section 3.4.27](#) [section 3.4.27](#).

The duration expression MAY be provided using element notation or attribute notation.

Example 43:

```
<Annotation Term="org.example.task.duration" Duration="P7D" />

<Annotation Term="org.example.task.duration">
  <Duration>P11D23H59M59.999999999999S</Duration>
</Annotation>
```

14.4.614.4.7 Expression edm:EnumMember

The edm:EnumMember expression [enables references](#) a [value to be obtained by referencing a member](#) of an [enumeration type](#). An enumeration member expression MUST be assigned a value that consists of the qualified name of the enumeration type, followed by a [dotforward slash](#) and the name of the enumeration member. If the enumeration type specifies an IsFlags attribute with value true, the expression MAY also be assigned a whitespace-separated list of values. Each of these values MUST resolve to the name of a member of the enumeration type of the specified term.

The enumeration member expression MAY be provided using element notation or attribute notation.

Example 44: single value

```
<Annotation Term="org.example.HasPattern"
  EnumMember="org.example.Pattern-Yellow/Red" />

<Annotation Term="org.example.HasPattern">
  <EnumMember>
    org.example.Pattern-Yellow
    org.example.Pattern.Striped
  -/Red</EnumMember>
</Annotation>
```

Example 45: combined value for IsFlags enumeration type

```
<Annotation Term="org.example.HasPattern"
  EnumMember="org.example.Pattern/Red org.example.Pattern/Striped" />

<Annotation Term="org.example.HasPattern">
  <EnumMember>org.example.Pattern/Red org.example.Pattern/Striped</EnumMember>
</Annotation>
```

14.4.714.4.8 Expression edm:Float

The edm:Float expression evaluates to a primitive floating point (or double) value. A float expression MUST be assigned a value of the type xs:double, see [XML-Schema-2], [section 3.2.5](#) [section 3.2.5](#).

The float expression MAY be provided using element notation or attribute notation.

Example 46:

```
<Annotation Term="org.example.display.Width" Float="3.14-"/>

<Annotation Term="org.example.display.Width">
  <Float>3.14</Float>
</Annotation>
```

14.4.814.4.9 Expression edm:Guid

The `edm:Guid` expression evaluates to a primitive 32-character string value. A guid expression MUST be assigned a value conforming to the rule `guid` in ~~[OData-ABNF]~~[\[OData-ABNF\]](#).

The guid expression MAY be provided using element notation or attribute notation~~:-~~.

Example 47:

```
<Annotation Term="org.example.display.Id"
  Guid="21EC2020-3AEA-1069-A2DD-08002B30309D" />

<Annotation Term="org.example.display.Id">
  <Guid>21EC2020-3AEA-1069-A2DD-08002B30309D</Guid>
</Annotation>
```

14.4.914.4.10 Expression edm:Int

The `edm:Int` expression evaluates to a primitive integer value. An integer MUST be assigned a value of the type `xs:integer`, see [\[XML-Schema-2\]](#), ~~section 3.3.13~~[section 3.3.13](#).

The integer expression MAY be provided using element notation or attribute notation~~:-~~.

Example 48:

```
<Annotation Term="org.example.display.Width" Int="42" />

<Annotation Term="org.example.display.Width">
  <Int>42</Int>
</Annotation>
```

14.4.1014.4.11 Expression edm:String

The `edm:String` expression evaluates to a primitive string value. A string expression MUST be assigned a value of the type `xs:string` see [\[XML-Schema-2\]](#), ~~section 3.2.1~~[section 3.2.1](#).

The string expression MAY be provided using element notation or attribute notation~~:-~~.

Example 49:

```
<Annotation Term="org.example.display.DisplayName" String="Product Catalog" />

<Annotation Term="org.example.display.DisplayName">
  <String>Product Catalog</String>
</Annotation>
```

14.4.1114.4.12 Expression edm:TimeOfDay

The `edm:TimeOfDay` expression evaluates to a primitive time value. ~~On platforms that do not support a primitive time value, the time expression evaluates to a primitive date/time value. A TimeOfDay~~[A time-of-day](#) expression MUST be assigned a value of the type `xs:time` see [\[XML-Schema-2\]](#), ~~section 3.3.8~~[section 3.3.8](#). The value MUST NOT contain an end-of-day fragment (24:00:00) or a time-zone offset.

The ~~time-of-day~~ expression MAY be provided using element notation or attribute notation~~:-~~.

Example 50:

```

<Annotation Term="org.example.display.EndTime" TimeOfDay="21:45:00" />

<Annotation Term="org.example.display.EndTime">
  <TimeOfDay>21:45:00</TimeOfDay>
</Annotation>

```

14.5 Dynamic Expressions

~~Values for a term or properties of a term are obtained by calculating expressions. There are a variety of expressions that allow service authors to supply dynamic values.~~

Dynamic expressions allow assigning a calculated value to an applied term. The dynamic expressions `edm:NavigationPropertyPath`, `edm:Path`, `edm:PropertyPath`, and `edm:UrlRef` expressions support element and attribute notation, all other dynamic expressions only support element notation.

14.5.1 Comparison and Logical Operators

The following EDM elements allow service authors to supply a dynamic conditional expression which evaluates to a value of type `Edm.Boolean`. They MAY be combined and they MAY be used anywhere instead of an `edm:Bool` expression.

Element	Description	Example
Logical Operators		
<code>edm:And</code>	Logical and	<code><And><Path>IsMale</Path><Path>IsMarried</Path></And></code>
<code>edm:Or</code>	Logical or	<code><Or><Path>IsMale</Path><Path>IsMarried</Path></Or></code>
<code>edm:Not</code>	Logical negation	<code><Not><Path>IsMale</Path></Not></code>
Comparison Operators		
<code>edm:Eq</code>	Equal	<code><Eq><Null/><Path>IsMale</Path></Eq></code>
<code>edm:Ne</code>	Not equal	<code><Ne><Null/><Path>IsMale</Path></Ne></code>
<code>edm:Gt</code>	Greater than	<code><Gt><Path>Price</Path><Int>20</Int></Gt></code>
<code>edm:Ge</code>	Greater than or equal	<code><Ge><Path>Price</Path><Int>10</Int></Ge></code>
<code>edm:Lt</code>	Less than	<code><Lt><Path>Price</Path><Int>20</Int></Lt></code>
<code>edm:Le</code>	Less than or equal	<code><Le><Path>Price</Path><Int>100</Int></Le></code>

The `edm:And` and `edm:Or` elements require two child expressions that evaluate to Boolean values. The `edm:Not` elements requires a single child expression that evaluates to a Boolean value.

The other elements representing the comparison operators require two child expressions that evaluate to comparable values.

14.5.2 Expression `edm:AnnotationPath`

The `edm:AnnotationPath` expression provides a value for terms or term properties that specify the built-in abstract type `Edm.AnnotationPath`. It uses the same syntax and rules as the `edm:Path` expression, with the added restriction that the last path segment MUST be a term cast with optional qualifier in the context of the preceding path part.

In contrast to the `edm:Path` expression the value of the `edm:AnnotationPath` expression is the path itself, not the value of the annotation identified by the path. This is useful for terms that reuse or refer to other terms.

The `edm:AnnotationPath` expression MAY be provided using element notation or attribute notation.

Example 51:

```
<Annotation Term="UI.ReferenceFacet"
  AnnotationPath="Product/Supplier/@UI.LineItem" />

<Annotation Term="UI.CollectionFacet" Qualifier="Contacts">
  <Collection>
    <AnnotationPath>Supplier/@Communication.Contact</AnnotationPath>
    <AnnotationPath>Customer/@Communication.Contact</AnnotationPath>
  </Collection>
</Annotation>
```

14.5.14.5.3 Expression `edm:Apply`

The `edm:Apply` expression enables a value to be obtained by applying a client-side function. The `Apply` expression MUST contain at least one expression. The expressions contained within the `Apply` expression are used as parameters to the function. The `edm:Apply` expression MUST be written with element notation.

~~The `Apply` expression contains or more expressions. The expressions contained within the `Apply` expression are used as parameters to the function.~~

14.5.3.1 Attribute Function

The `edm:Apply` expression MUST ~~be written with element notation.~~

14.5.1.1 Attribute Function

~~An `Apply` expression MUST assign~~include a ~~QualifiedName value to the~~ `Function` attribute. ~~The value whose value is a QualifiedName specifying the name of the function attribute is used to locate the client-side function that should be applied to apply.~~

OData defines the following canonical functions. Services MAY support additional functions that MUST be qualified with a namespace or alias other than `odata`. Function names qualified with `odata` are reserved for this specification and its future versions.

14.5.1.1.114.5.3.1.1 Function `odata.concat`

The `odata.concat` standard client-side function takes two or more expressions as arguments. Each argument MUST evaluate to a primitive or enumeration type. It returns a value of type `Edm.String` that is the concatenation of the literal representations of the results of the argument expressions; see `xxxValue` rules [OData-ABNF].

Example 52:

```
<Annotation Term="org.example.display.DisplayName">
  <Apply Function="odata.concat">
    <String>Product: </String>
    <Path>ProductName</Path>
    <String> (</String>
    <Path>Available/Quantity</Path>
    <String> </String>
    <Path>Available/Unit</Path>
    <String> available)</String>
  </Apply>
</Annotation>
```

~~Here~~ `ProductName` is of type `String`, `Quantity` in complex type `Available` is of type `Decimal`, and `Unit` in `Available` is of type enumeration, so the result of the `Path` expression is represented as the member name of the enumeration value.

14.5.1.1.2 14.5.3.1.2 Function `odata.fillUriTemplate`

The `odata.fillUriTemplate` standard client-side function takes two or more expressions as arguments.

The first argument MUST be of type `Edm.String` and specifies a URI template according to [\[RFC6570\]](#). The other arguments MUST be `edm:LabeledElement` expressions. Each `edm:LabeledElement` expression specifies the template parameter name in its `Name` attribute and evaluates to the template parameter value.

[\[RFC6570\]](#) defines three kinds of template parameters: simple values, lists of values, and key-value maps.

Simple values are represented as `edm:LabeledElement` expressions that evaluate to a single primitive value. The literal representation of this value according to [\[OData-ABNF\]](#) is used to fill the corresponding template parameter.

Lists of values are represented as `edm:LabeledElement` expressions that evaluate to a collection of primitive values.

Key-value maps are represented as `edm:LabeledElement` expressions that evaluate to a collection of complex types with two properties that are used in lexicographic order. The first property is used as key, the second property as value.

Example 53: assuming there are no special characters in values of the `NameOfMovieGenre` property:

```
<Apply Function="odata.fillUriTemplate">
  <String>http://host/service/Genres('{genreName}')</String>
  <LabeledElement Name="genreName" Path="NameOfMovieGenre" />
</Apply>
```

14.5.1.1.3 14.5.3.1.3 Function `odata.uriEncode`

The `odata.uriEncode` standard client-side function takes one argument of primitive type and returns the URL-encoded OData literal that can be used as a key value in OData URLs or in the query part of OData URLs. Note ~~that~~: string literals are surrounded by single quotes.

Example 54:

```
<Apply Function="odata.fillUriTemplate">
  <String>http://host/service/Genres({genreName})</String>
  <LabeledElement Name="genreName">
    <Apply Function="odata.uriEncode" >
      <Path>NameOfMovieGenre</Path>
    </Apply>
  </LabeledElement>
</Apply>
```

14.5.2 14.5.4 Expression `edm:AssertTypeCast`

The `edm:AssertTypeCast` expression ~~asserts that a~~ casts the value obtained from ~~its single~~ child expression ~~is of a specified type. The value calculated by the assert type expression is the value obtained from the child expression casted to the specified type. The cast expression follows the same rules as the cast canonical function defined in [OData-URL].~~

The `assert-typecast` expression MUST specify a `TypeType` attribute and contain exactly one expression.

~~The expression contained within the assert type expression is used as a parameter to the type assertion.~~

The `assert-typecast` expression MUST be written with element notation.

Example 55:

```

<Annotation Term="org.example.display.DisplayName">
  <AssertTypeThreshold>
    <Cast Type="Edm.String">
      <String>Product Catalog</String>
    </AssertTypeDecimal>
    <Path>Average</Path>
  </Cast>
</Annotation>

```

14.5.2.1 14.5.4.1 Attribute Type

The `edm:AssertTypeCast` expression MUST specify a `Type` attribute whose value is a `TypeName` in scope.

If the specified type is a primitive type, the facet attributes `MaxLength`, `Precision`, `Scale`, and `SRID` MAY be specified if applicable to the specified primitive type. If the facet attributes are not specified, their values are considered unspecified.

14.5.3 14.5.5 Expression `edm:Collection`

The `edm:Collection` expression enables a value to be obtained from zero or more child expressions. The value calculated by the collection expression is the collection of the values calculated by each of the child expressions.

AThe collection expression contains zero or more child expressions. The values of the child expressions MUST all be type compatible.

AThe collection expression MUST be written with element notation:.

Example 56:

```

<Annotation Term="org.example.seo.SeoTerms">
  <Collection>
    <String>Product</String>
    <String>Supplier</String>
    <String>Customer</String>
  </Collection>
</Annotation>

```

14.5.4 14.5.6 Expression `edm:If`

The `edm:If` expression enables a value to be obtained by evaluating a *conditional expression*. It MUST contain exactly three child elements with dynamic or static expressions. There is one exception to this rule: if and only if the `edm:If` expression is a direct child of `edm:Collection` element the third child element MAY be omitted (this can be used to conditionally add an element to a collection).

The first child **expression**element is the conditional expression and MUST evaluate to a **Boolean**Boolean result, e.g. the comparison and logical operators can be used.

The second and third child **expression**elements are the expressions_i which are evaluated conditionally. They **result** MUST **return**be type compatible **values**with the type expected by the surrounding element or expression.

If the first expression evaluates to `true`, the second child **expression**element MUST be evaluated and its value MUST be returned as the result of the `edm:If` expression. If the conditional expression evaluates to `false`, the and a third child **expression**element is present, it MUST be evaluated and its value MUST be returned as the result of the `edm:If` expression. If no third child element is present, nothing is added to the collection.

The `edm:If` expression MUST be written with element notation, as shown in the following example:.

Example 57:

```

<Annotation Term="org.example.person.Gender">
  <If>
    <Path>IsFemale</Path>
    <String>Female</String>
    <String>Male</String>
  </If>
</Annotation>

```

14.5.5 14.5.7 Expression `edm:IsTypeIsOf`

The `edm:IsTypeIsOf` expression evaluates a child expression and returns a Boolean value indicating whether the child expression returns the specified type.

An `edm:IsTypeIsOf` expression MUST specify a `TypeType` attribute and contain exactly one child expression. The `edm:IsTypeIsOf` expression MUST return `true` if the child expression returns a type that is compatible with the type named in the `TypeType` attribute. The `edm:IsTypeIsOf` expression MUST return `false` if the child expression returns a type that is not compatible with the type named in the `TypeType` attribute.

The `edm:IsTypeIsOf` expression MUST be written with element notation:.

Example 58:

```

<Annotation Term="Self.IsPreferredCustomer">
  <IsType <IsOf Type="Self.PreferredCustomer">
    <Path>Customer</Path>
  </IsType </IsOf>
</Annotation>

```

14.5.5 14.5.7.1 Attribute `Type`

The `edm:IsType` `edm:IsOf` expression MUST specify a `Type` attribute whose value is a `TypeName` `TypeName` in scope.

If the specified type is a primitive type, the facet attributes `MaxLength`, `Precision`, `Scale`, and `SRID` MAY be specified if applicable to the specified primitive type. If the facet attributes are not specified, their values are considered unspecified.

14.5.6 14.5.8 Expression `edm:LabeledElement`

The `edm:LabeledElement` expression assigns a name to a child expression. The value of the child expression can then be reused elsewhere with an

`edm:LabeledElementReference` `edm:LabeledElementReference` expression.

A labeled-element expression MUST contain exactly one child expression written either in attribute notation or element notation. The value of the child expression is passed through the labeled-element expression.

A labeled-element expression MUST be written with element notation:.

Example 59:

```

<Annotation Term="org.example.display.DisplayName">
  <LabeledElement Name="CustomerFirstName">
    <Path>"FirstName"</Path>
  </LabeledElement>
</Annotation>

<Annotation Term="org.example.display.DisplayName">
  <LabeledElement Name="CustomerFirstName">
    <Path>FirstName</Path>
  </LabeledElement>
</Annotation>

```

~~14.5.6.1~~14.5.8.1 Attribute Name

An ~~edm:LabeledElement~~edm:LabeledElement expression MUST provide a ~~SimpleIdentifier~~SimpleIdentifier value for the Name attribute.

~~14.5.7~~14.5.9 Expression edm:LabeledElementReference

The edm:LabeledElementReference expression returns the value of an ~~edm:LabeledElement~~edm:LabeledElement expression.

The labeled-element reference expression MUST contain the ~~SimpleIdentifier~~SimpleIdentifier name of a labeled element expression in scope.

The labeled-element reference expression MUST be written with element notation~~.~~.

Example 60:

```
<Annotation Term="org.example.display.DisplayName">
  <LabeledElementReference>DisplayName</LabeledElementReference>
</Annotation>
```

~~14.5.8~~14.5.10 Expression edm:Null

The edm:Null expression returns an untyped null value. The null expression MUST NOT contain any other elements or expressions.

The null expression MUST be written with element notation~~.~~.

Example 61:

```
<Annotation Term="org.example.display.DisplayName">
  <Null/>
</Annotation>
```

~~14.5.9~~14.5.11 Expression edm:NavigationPropertyPath

The edm:NavigationPropertyPath expression provides a value for terms or term properties that specify the ~~built-in abstract type~~built-in abstract type Edm.NavigationPropertyPath. It uses the same syntax and rules as the ~~edm:Path~~edm:Path expression, with the added restriction that the last path segment MUST resolve to a navigation property in the context of the preceding path part.

In contrast to the ~~edm:Path~~edm:Path expression the value of the edm:NavigationPropertyPath expression is the path itself, not the target instance(s) of the navigation property identified by the path. This is useful for terms that describe the semantics of a group of navigation properties and thus cannot be applied to a single navigation property.

The edm:NavigationPropertyPath expression MAY be provided using element notation or attribute notation~~.~~.

Example 62:

```
<Annotation Term="UI.HyperLink" NavigationPropertyPath="Supplier"/>

<Annotation Term="Capabilities.UpdateRestrictions">
  <PropertyValue Property="NonUpdatableNavigationProperties">
    <Collection>
      <NavigationPropertyPath>Supplier</NavigationPropertyPath>
      <NavigationPropertyPath>Category</NavigationPropertyPath>
    </Collection>
  </PropertyValue>
</Annotation>
```

14.5.1014.5.12 Expression `edm:Path`

The `edm:Path` expression enables a value to be obtained by traversing an object graph. It can be used in annotations that target entity containers, entity sets, entity types, complex types, navigation properties of `entitystructured` types, and properties of ~~entity types and complex~~`structured` types.

The value assigned to the path expression MUST be composed of zero or more path segments joined together by forward slashes (/).

If the path segment is a `QualifiedNameQualifiedName`, it represents a *type cast*, and the segment MUST be the name of a type in scope. If the instance identified by the preceding path part cannot be cast to the specified type, the path expression evaluates to ~~at~~`the` null value.

If the path segment start with an at (@) character, it represents a *term cast*. The at (@) character MUST be followed by a `QualifiedNameQualifiedName` that MAY be followed by a hash (#) character and a `SimpleIdentifier.SimpleIdentifier`. The `QualifiedNameQualifiedName` preceding the hash character MUST resolve to a term that is in scope, the `SimpleIdentifierSimpleIdentifier` following the hash sign is interpreted as a `QualifierQualifier` for the term. If the instance identified by the preceding path part has been annotated with that term (and if present, with that qualifier), the term cast evaluates to the value of that annotation, otherwise it evaluates to the null value. Three special annotations are implicitly “annotated” for media entities and ~~named~~ stream properties:

- `odata.mediaEditLink`
- `odata.mediaReadLink`
- `odata.mediaContentType`

If the path segment is a `SimpleIdentifierSimpleIdentifier`, it MUST be the name of a structural property or a navigation property of the instance identified by the preceding path part.

If a path segment is the name of a navigation property that has a cardinality of many, the path MUST NOT have any subsequent segments other than ~~at most one~~-type ~~cast~~`casts`, term ~~cast~~`casts`, or a `$count` segment. If the last segment is a `$count` segment, the path evaluates to the number of related entities.

Annotations MAY be embedded within their target, or embedded within an `edm:Annotationsedm:Annotations` element that specifies the annotation target with a path expression in its ~~Target~~`Target` attribute. The latter situation is referred to as *targeting* in the remainder of this section.

For annotations embedded within or targeting an entity container, the path expression is evaluated starting at the entity container, i.e. an empty path resolves to the entity container, and non-empty path values MUST start with the name of a container child (entity set, function import, action import, or ~~named entity~~`singleton`). The subsequent segments follow the rules for path expressions targeting the corresponding child element.

For annotations embedded within or targeting an entity set or a ~~named entity~~`singleton`, the path expression is evaluated starting at the entity set, i.e. an empty path resolves to the entity set, and non-empty paths MUST follow the rules for annotations targeting the declared entity type of the entity set or ~~named entity~~`singleton`.

For annotations embedded within or targeting an entity type or complex type, the path expression is evaluated starting at the type, i.e. an empty path resolves to the type, and the first segment of a non-empty path MUST be a property or navigation property of the type, a type cast, or a term cast.

For annotations embedded within a property of an entity type or complex type, the path expression is evaluated starting at the directly enclosing type. This allows e.g. specifying the value of an annotation on one property to be calculated from values of other properties of the same type. An empty path resolves to the enclosing type, and non-empty paths MUST follow the rules for annotations targeting the directly enclosing type.

For annotations targeting a property of an entity type or complex type, the path expression is evaluated starting at the *outermost* entity type or complex type ~~in the path expression of the Target attribute~~`named in the Target` of the enclosing `edm:Annotationsedm:Annotations` element, i.e. an empty path

resolves to the outermost type, and the first segment of a non-empty path MUST be a property or navigation property of the outermost type, a type cast, or a term cast.

A path expression MAY be provided using element notation or attribute notation.

Example 63:

```
<Annotation Term="org.example.display.DisplayName" Path="FirstName" />

<Annotation Term="org.example.display.DisplayName">
  <Path>@vCard.Address#work/FullName</Path>
</Annotation>
```

14.5.11 14.5.13 Expression `edm:PropertyPath`

The `edm:PropertyPath` expression provides a value for terms or term properties that specify the ~~built-in abstract type~~ `built-in abstract type` `Edm.PropertyPath`. It uses the same syntax and rules as the ~~`edm:Path`~~ `edm:Path` expression, with the added restriction that the last path segment MUST resolve to a property in the context of the preceding path part. It MUST NOT resolve to a navigation property.

In contrast to the ~~`edm:Path`~~ `edm:Path` expression the value of the `edm:PropertyPath` expression is the path itself, not the value of the property identified by the path. This is useful for terms that describe the semantics of a group of properties and thus cannot be applied to a single property.

The `edm:PropertyPath` MAY be provided using either element notation or attribute notation.

Example 64:

```
<Annotation Term="UI.RefreshOnChangeOf" PropertyPath="ChangedAt" />

<Annotation Term="Capabilities.UpdateRestrictions">
  <PropertyValue Property="NonUpdatableProperties">
    <Collection>
      <PropertyPath>CreatedAt</PropertyPath>
      <PropertyPath>ChangedAt</PropertyPath>
    </Collection>
  </PropertyValue>
</Annotation>
```

14.5.12 14.5.14 Expression `edm:Record`

The `edm:Record` expression enables a new entity type or complex type instance to be constructed.

A record expression contains zero or more ~~`edm:PropertyValue`~~ `edm:PropertyValue` elements. For each ~~non-nullable single-valued~~ property of the record construct's type that is neither nullable nor specifies a default value an ~~`edm:PropertyValue`~~ `edm:PropertyValue` child element MUST be provided. For derived types this rule applies only to properties directly defined by the derived type. For collection-valued properties the absence of an `edm:PropertyValue` child element is equivalent to specifying a child element with an empty collection as its value.

A record expression MUST be written with element notation, as shown in the following example.

Example 65:

```
<Annotation Term="org.example.person.Employee">
  <Record>
    <PropertyValue Property="GivenName" Path="FirstName" />
    <PropertyValue Property="Surname" Path="LastName" />
  </Record>
</Annotation>
```

~~14.5.12.1~~14.5.14.1 Attribute Type

A record expression MAY specify a ~~QualifiedName~~QualifiedName value for the `Type` attribute that MUST resolve to an entity type or complex type in scope. If no value is specified for the type attribute, the type is derived from the expression's context.

~~14.5.12.2~~14.5.14.2 Element `edm:PropertyValue`

The `edm:PropertyValue` element supplies a value to a property on the type instantiated by an ~~edm:Record~~edm:Record expression. The value is obtained by evaluating an expression.

The `PropertyValue` element MUST contain exactly one expression. The edm:PropertyValue expression MAY be provided using element notation or attribute notation.

14.5.14.2.1 Attribute `Property`

The `PropertyValue` element MUST assign a ~~SimpleIdentifier~~SimpleIdentifier value to the `Property` attribute. The value of the property attribute MUST resolve to a property of the type of the enclosing ~~edm:Record~~edm:Record expression.

~~14.5.13~~14.5.15 Expression `edm:Url`UrlRef

The `edm:Url`UrlRef expression enables a value to be obtained by sending a GET request to the value of the `Url` expression.

The `edm:Url`UrlRef element MUST contain exactly one expression of type `Edm.String`. The `edm:Url`UrlRef expression MAY be provided using element notation or attribute notation.

The response body of the GET request MUST be returned as the result of the `edm:Url`UrlRef expression. The result of the `edm:Url`UrlRef expression MUST be type compatible with the type expected by the surrounding element or expression.

Example 66:

```
<Annotation Term="Vocab.Supplier">
<Url>
  <UrlRef>
    <Apply Function="odata.fillUriTemplate">
      <String>http://host/service/Suppliers({suppID})</String>
      <LabeledElement Name="suppID">
        <Apply Function="odata.uriEncode">
          <Path>SupplierId</Path>
        </Apply>
      </LabeledElement>
    </Apply>
  </UrlRef>
</Url>
</Annotation>
```


15 Metadata Service Schema

An OData The Metadata Service is a representation of the data model that describes the data and operations exposed by entity model of an OData service as an OData service with a fixed (meta) data model. The Metadata Service provides convenient access to the entity model of a service, i.e. all CSDL constructs used in its entity containers.

With ~/ as an abbreviation for the service root URL, the Metadata Service root URL is ~/ \$metadata/, and i.e. the canonical URL of the metadata document of the underlying service with a forward slash appended, and a GET request

GET ~/ \$metadata/\$ to ~/ \$metadata/\$metadata returns the CSDL document of the Metadata Service itself, defined in [OData-Meta].

MUST return The following sections describe the CSDL schema of the Metadata Service.

Example 67: service document [OData-Meta] of Metadata Service

Schemas GET ~/ \$metadata/

would return

```
{
  "odata.context": "~/ $metadata/$metadata",
  "value": [
    { "name": "References" , "url": "References" },
    { "name": "Schemata" , "url": "Schemata" },
    { "name": "Types" , "url": "Types" },
    { "name": "Properties" , "url": "Properties" },
    { "name": "NavigationProperties" , "url": "NavigationProperties" },
    { "name": "EnumTypeMembers" , "url": "EnumTypeMembers" },
    { "name": "Actions" , "url": "Actions" },
    { "name": "Functions" , "url": "Functions" },
    { "name": "Terms" , "url": "Terms" },
    { "name": "Annotations" , "url": "Annotations" },
    { "name": "EntityContainer" , "url": "EntityContainer",
      "kind": "Singleton" },
    { "name": "EntitySets" , "url": "EntitySets" },
    { "name": "Singletons" , "url": "Singletons" },
    { "name": "NavigationPropertyBindings" , "url": "NavigationPropertyBindings" },
    { "name": "ActionImports" , "url": "ActionImports" },
    { "name": "FunctionImports" , "url": "FunctionImports" }
  ]
}
```

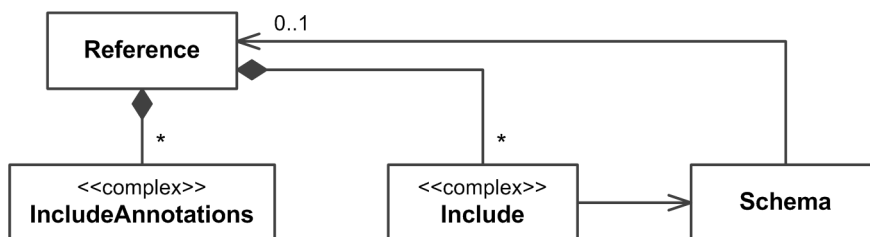
Note: all examples in this chapter use ~/ as an abbreviation for the service root URL.

Note: ~/ \$metadata/\$metadata is not a type, it is the metadata URL of the Metadata Service for the service with root URL ~/.

15.1 Entity Model Wrapper

The Metadata Service provides convenient access to the entity model of a service, i.e. all CSDL constructs used in its entity containers. This model may be distributed over several schemas, and these schemas may be distributed over several physical locations, bound together via the entity model wrapper.

This document structure is represented in the metadata service as an entity type *Reference* and two complex types *Include* and *IncludeAnnotations*.



Legend: boxes without a stereotype represent entity types; boxes with stereotype <<complex>> represent complex types. Compositions represent complex properties; associations represent navigation properties. Arrows indicate navigation properties without a partner; associations without arrows are bidirectional. No multiplicity means 1.

A reference is identified with a ~~Fullname~~ key by its *Uri* property ~~that is the~~, which is the absolute value of the *Uri* attribute after resolving a relative value against the *xml:base* attribute.

Example 68: for the Products and Categories example the request

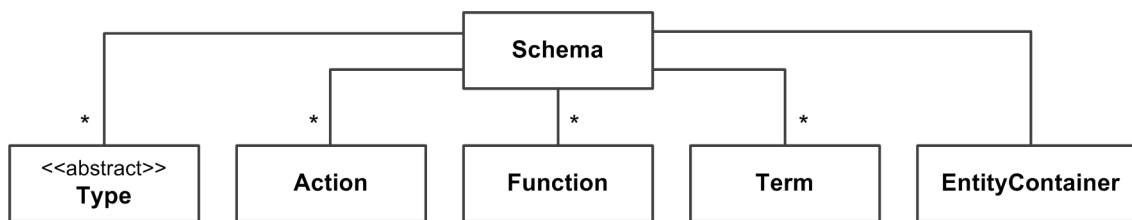
```
GET ~/ $metadata/References?$expand=Include/Schema ($select=Namespace)
```

would return

```
{
  "odata.context":
    "~/ $metadata/ $metadata#References (., Include/Schema (Namespace)) ",
  "value": [
    {
      "Uri": "http://tinyurl.com/Org-OData-Core",
      "Include": [
        { "Alias": "Core", "Schema": { "Namespace": "Org.OData.Core.V1" } }
      ],
      "IncludeAnnotations": []
    }, {
      "Uri": "http://tinyurl.com/Org-OData-Measures-V1",
      "Include": [
        { "Alias": "UoM", "Schema": { "Namespace": "Org.OData.Measures.V1" } }
      ],
      "IncludeAnnotations": []
    }
  ]
}
```

15.2 Schema

The *model* of the service consists of all CSDL constructs used in its entity containers. Each model construct is defined in a schema:



A schema is identified by its `Namespace` property. If it defines an alias of, direct key access using the schema, and if no alias is defined, instead of the namespace of redirects to the schema, for example: with this alias.

Example 69: for the Products and Categories example the request

```
GET ~/ $metadata/Schemata ('SampleModel')
```

Model elements that are identified with a `Name` attribute within their parent element are represented in this schema by entity types in with a `Fullname` key property whose value is obtained by appending a dot (.) and the `Name` of the model element to the `Fullname` of the entity representing the parent element, for example:

GET ~/\$ would return

```
{
  "odata.context": "~/ $metadata/EntityTypes ('SampleModel.Customer') #Schemata",
  "value": [
    {
      "Namespace": "ODataDemo", "Alias": null
    }, {
      "Namespace": "Org.OData.Core.V1", "Alias": "Core"
    }, {
      "Namespace": "Org.OData.Measures.V1", "Alias": "UoM"
    }, {
      "Namespace": "Edm", "Alias": null
    }
  ]
}
```

Example 70: redirecting from alias to schema

```
GET ~/ $metadata/Schemata ('Core')
```

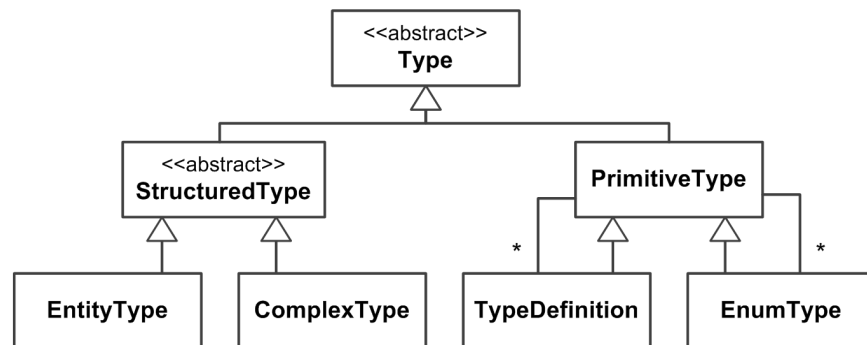
would return

```
{
  "odata.context": "~/ $metadata#Schemata/@entity",
  "Namespace": "Org.OData.Core.V1",
  "Alias": "Core"
}
```

All schemata used in the model are listed in this entity set, independently of whether they are defined directly in the metadata document or included via a reference.

15.3 Types

Types form an inheritance hierarchy



A type is identified by its `QualifiedName` property, which is the `Namespace` of the defining schema, followed by a dot (.) and the `Name` of the type. There is only one entity set `Types` for all types. Type cast segments can be used to access specialized types.

Only those built-in primitive types that are actually used in the model appear in the `Types` entity set.

Example 71: single type by name, and all entity types

```
GET ~/ $metadata/Types ('ODataDemo.Product')
GET ~/ $metadata/Types/Meta.EntityType
```

Example 72: all types

```
GET ~/ $metadata/Types
```

would return

```
{
  "odata.context": "~/ $metadata/ $metadata#Types",
  "value": [ {
    "odata.type": "Meta.EntityType",
    "QualifiedName": "ODataDemo.Product", "Name": "Product",
    "Key": [ { "PropertyPath": "ID", "Alias": null } ],
    "Abstract": false, "OpenType": false, "HasStream": true
  }, {
    "odata.type": "Meta.EntityType",
    "QualifiedName": "ODataDemo.Category", "Name": "Category",
    "Key": [ { "PropertyPath": "ID", "Alias": null } ],
    "Abstract": false, "OpenType": false, "HasStream": false
  }, {
    "odata.type": "Meta.EntityType",
    "QualifiedName": "ODataDemo.Supplier", "Name": "Supplier",
    "Key": [ { "PropertyPath": "ID", "Alias": null } ],
    "Abstract": false, "OpenType": false, "HasStream": false
  }, {
    "odata.type": "Meta.EntityType",
    "QualifiedName": "ODataDemo.Country", "Name": "Country",
    "Key": [ { "PropertyPath": "Code", "Alias": null } ],
    "Abstract": false, "OpenType": false, "HasStream": false
  }, {
    "odata.type": "Meta.ComplexType",
    "QualifiedName": "ODataDemo.Address", "Name": "Address",
    "Abstract": false, "OpenType": false
  }, {
    "odata.type": "Meta.ComplexType",
    "QualifiedName": "Core.OptimisticConcurrencyControl",
    "Name": "OptimisticConcurrencyControl",
  } ]
}
```

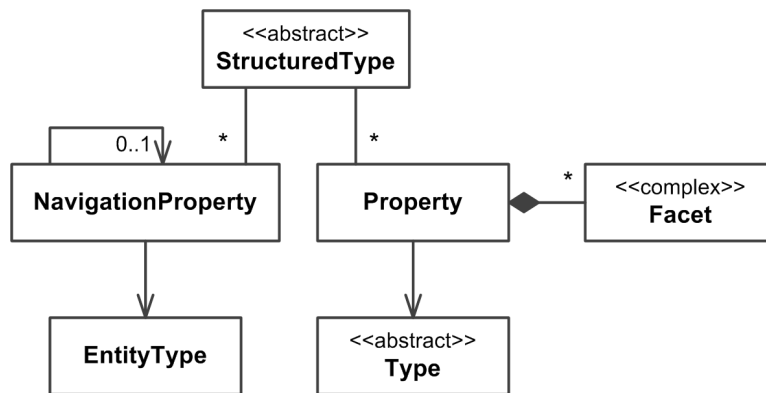
```

    "Abstract":false, "OpenType":false
  }, {
    "odata.type":"Meta.PrimitiveType",
    "QualifiedName":"Edm.Date", "Name":"Date"
  }, {
    "odata.type":"Meta.PrimitiveType",
    "QualifiedName":"Edm.Decimal", "Name":"Decimal"
  }, {
    "odata.type":"Meta.PrimitiveType",
    "QualifiedName":"Edm.Int32", "Name":"Int32"
  }, {
    "odata.type":"Meta.PrimitiveType",
    "QualifiedName":"Edm.String", "Name":"String"
  }, {
    "odata.type":"Meta.PrimitiveType",
    "QualifiedName":"Edm.PropertyPath", "Name":"PropertyPath"
  }, {
    "odata.type":"Meta.EntityType",
    "QualifiedName":"Edm.EntityType", "Name":"EntityType", "Key":[],
    "Abstract":true, "OpenType":false, "HasStream":false
  }
]
}

```

15.4 Properties('SampleModel.Customer.ID')

Structural properties and navigation properties are represented as



This model is intentionally simplified. It closely resembles the XML schema and makes querying easy as it e.g. allows expanding the **Type** for all structural properties. A structured type is only related to properties it directly declares, not to properties it inherits from ancestor types. All inherited and directly declared properties or navigation properties can be requested with the bound functions **Meta.AllProperties** and **Meta.AllNavigationProperties**.

Structural properties and navigation properties are identified by their **Fullname** property, which is the **QualifiedName** of the containing entity type or complex type, followed by a forward slash (/) and the **Name** of the property or navigation property.

Example 73: single property or navigation property by name

```

GET ~/ $metadata/Properties (ODataDemo.Product%2FID')
GET ~/ $metadata/NavigationProperties (ODataDemo.Category%2FProducts)

```

Example 74: all properties with type

```

GET ~/ $metadata/Properties?$expand=Type ($select=QualifiedName)

```

would return

```

{
  "odata.context": "~/$metadata/$metadata#Properties(*,Type(QualifiedName))",
  "value": [
    {
      "Fullname": "ODataDemo.Product/ID", "Name": "ID",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.String"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Product/Description", "Name": "Description",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.String"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Product/ReleaseDate", "Name": "ReleaseDate",
      "Nullable": true, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.Date"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Product/DiscontinuedDate",
      "Name": "DiscontinuedDate",
      "Nullable": true, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.Date"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Product/Rating", "Name": "Rating",
      "Nullable": true, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.Int32"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Product/Currency", "Name": "Currency",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.String"},
      "Facets": [{"Name": "MaxLength", "Value": "3"}]
    }, {
      "Fullname": "ODataDemo.Category/ID", "Name": "ID",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.Int32"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Category/Name", "Name": "Name",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.String"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Supplier/ID", "Name": "ID",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.String"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Supplier/Name", "Name": "Name",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.String"},
      "Facets": []
    }, {
      "Fullname": "ODataDemo.Supplier/Address", "Name": "Address",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "ODataDemo.Address"},
      "Facets": []
    }, {
      "odata.type": "Meta.PrimitiveProperty",
      "Fullname": "ODataDemo.Supplier/Concurrency", "Name": "Concurrency",
      "Nullable": false, "IsCollection": false,
      "Type": {"QualifiedName": "Edm.Int32"},

```

```

    "Facets":[]
  },{
    "Fullname":"ODataDemo.Country/Code", "Name":"Code",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[{"Name":"MaxLength","Value":"2"}]
  },{
    "Fullname":"ODataDemo.Country/Name", "Name":"Name",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[]
  },{
    "Fullname":"ODataDemo.Address/Street", "Name":"Street",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[]
  },{
    "Fullname":"ODataDemo.Address/City", "Name":"City",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[]
  },{
    "Fullname":"ODataDemo.Address/State", "Name":"State",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[]
  },{
    "Fullname":"ODataDemo.Address/ZipCode", "Name":"ZipCode",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[]
  },{
    "Fullname":"ODataDemo.Address/CountryName", "Name":"CountryName",
    "Nullable":false, "IsCollection":false,
    "Type":{"QualifiedName":"Edm.String"},
    "Facets":[]
  },{
    "Fullname":"Core.OptimisticConcurrencyControl/ETagDependsOn",
    "Name":"ETagDependsOn",
    "Nullable":false, "IsCollection":true,
    "Type":{"QualifiedName":"Edm.PropertyPath"},
    "Facets":[]
  }
]
}

```

Example 75: all navigation properties with type and partner

```

GET ~/ $metadata/NavigationProperties?
    $expand=Type($select=QualifiedName),Partner($select=Name)

```

would return

```

{
  "odata.context":"~/ $metadata/$metadata#NavigationProperties(Type(QualifiedNa
me),Partner(Name))",
  {
    "Fullname":"ODataDemo.Product/Category", "Name":"Category",
    "Nullable":false, "ContainsTarget":false,
    "OnDelete":null,
    "ReferentialConstraints":[],
    "IsCollection":false,
    "Type":{"QualifiedName":"ODataDemo.Category" },
    "Partner":{"Name":"Product" }
  }
}

```

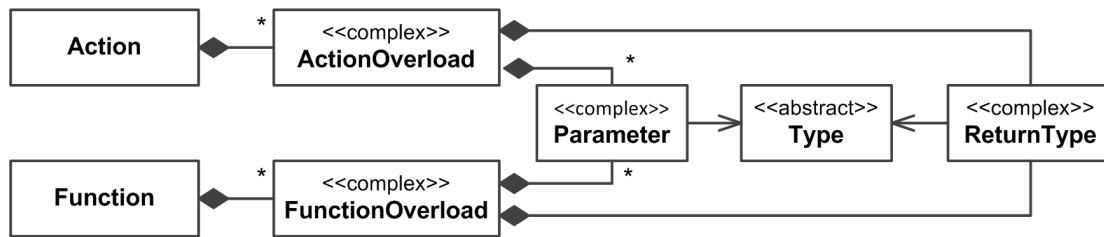
```

    }, {
      "Fullname": "ODataDemo.Product/Supplier", "Name": "Supplier",
      "Nullable": false, "ContainsTarget": false,
      "OnDelete": null,
      "ReferentialConstraints": [],
      "IsCollection": false,
      "Type": { "QualifiedName": "ODataDemo.Supplier" },
      "Partner": { "Name": "Products" }
    }, {
      "Fullname": "ODataDemo.Category/Products", "Name": "Products",
      "Nullable": false, "ContainsTarget": false,
      "OnDelete": { "Action": "Cascade", "Annotations": [] },
      "ReferentialConstraints": [],
      "IsCollection": true,
      "Type": { "QualifiedName": "ODataDemo.Product" },
      "Partner": { "Name": "Category" }
    }, {
      "Fullname": "ODataDemo.Supplier/Products", "Name": "Products",
      "Nullable": false, "ContainsTarget": false,
      "OnDelete": null,
      "ReferentialConstraints": [],
      "IsCollection": true,
      "Type": { "QualifiedName": "ODataDemo.Product" },
      "Partner": { "Name": "Supplier" }
    }, {
      "Fullname": "ODataDemo.Address/Country", "Name": "Country",
      "Nullable": false, "ContainsTarget": false,
      "OnDelete": null,
      "ReferentialConstraints": [
        {
          "Property": "CountryName", "ReferencedProperty": "Name",
          "Annotations": []
        }
      ],
      "IsCollection": false,
      "Type": { "QualifiedName": "ODataDemo.Product" },
      "Partner": { "Name": "Supplier" }
    }
  ]
}

```

15.5 Actions and Functions

Actions and functions are represented as



Actions and functions are identified by their `QualifiedName` property, which is the Namespace of the containing schema, followed by a dot (.) and the Name of the action or function.

Example 76:

```

GET ~/ $metadata/Actions ('SampleModel.Approval')
GET ~/ $metadata/Functions ('ODataDemo.ProductsByRating')

```

Example 77: all functions

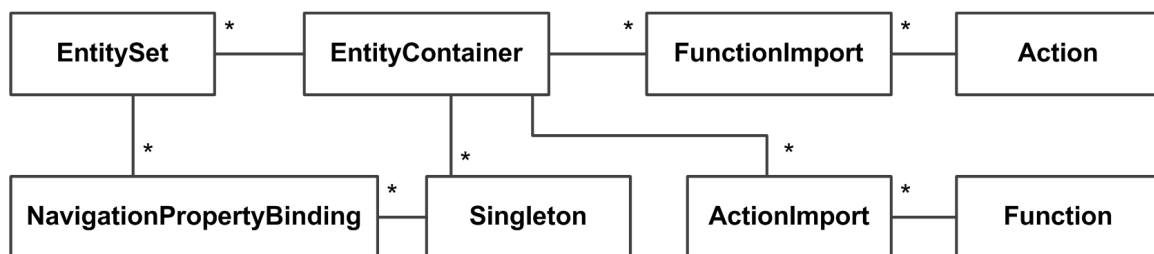
```
GET ~/ $metadata/Functions?
                                $expand=Overloads/Parameters/Type($select=QualifiedName)
```

would return

```
{
  "odata.context":
  "~/ $metadata/ $metadata#Functions(*,Overloads/Parameters/Type(QualifiedName))",
  "value": [
    {
      "QualifiedName": "ODataDemo.ProductsByRating",
      "Name": "ProductsByRating",
      "Overloads": [
        {
          "IsBindable": false, "IsComposable": false,
          "ReturnType": {
            "IsCollection": true, "Nullable": false, "Facets": [],
            "Type": { "QualifiedName": "ODataDemo.Product" }
          },
          "Parameters": [
            {
              "Name": "Rating", "IsBinding": false,
              "Nullable": true,
              "IsCollection": false, "Facets": [],
              "Type": { "QualifiedName": "Edm.Int32" }
            }
          ]
        }
      ]
    }
  ]
}
```

15.6 Entity Container

Entity container constructs are represented as



An entity container is identified by its `QualifiedName` property, which is the `Namespace` of the containing schema, followed by a dot (.) and the `Name` of the entity container. As there is exactly one entity container per service, it is a singleton.

Example 78:

```
GET ~/ $metadata/EntityContainer
```

Direct children of an entity container are identified by their `Fullname` property, which is the `QualifiedName` of the entity container, followed by a forward slash (/) and the `Name` of the child.

Example 79:


```
GET
~/odata/$metadata/EntitySets ('SampleModel.SalesData.Customers'ODataDemo.DemoService%
2FCategories')
```

A navigation property binding is identified by its `Fullname` property, which is the `Fullname` of the source entity set or singleton, followed by a forward slash (/) and the `Path` of the navigation property binding.

Example 80:

```
GET ~/odata/$metadata/NavigationPropertyBindings (
'ODataDemo.DemoService%2FCategories%2FProducts')
```

Example 81: all containers with direct children

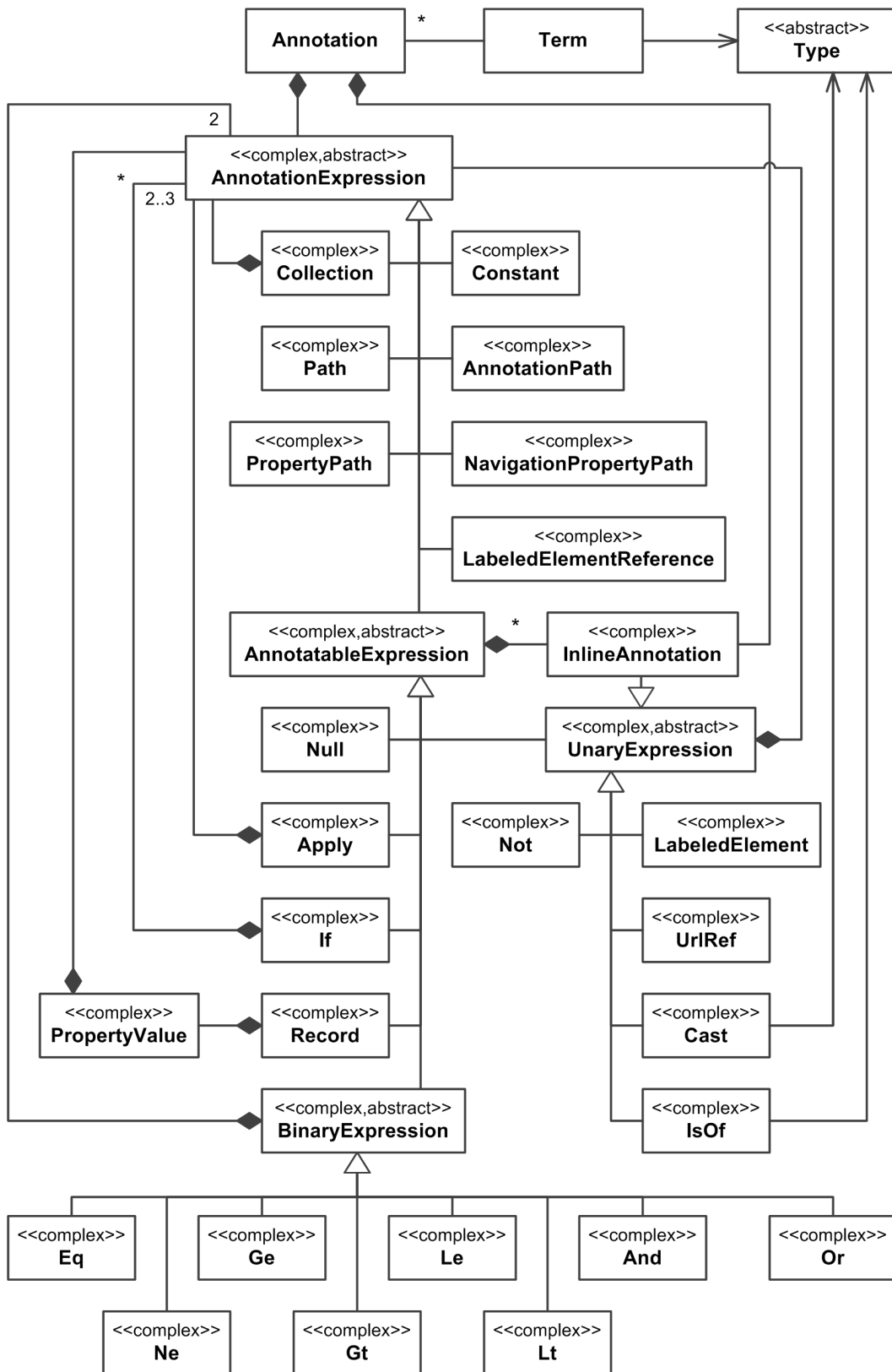
```
GET ~/odata/$metadata/EntityContainer?$expand=*
```

would return

```
{
  "odata.context": "~/odata/$metadata/$metadata#EntityContainer",
  "value": [
    {
      "QualifiedName": "ODataDemo.DemoService",
      "Name": "DemoService",
      "EntitySets": [
        {
          "Fullname": "ODataDemo.DemoService/Products", "Name": "Products"
        }, {
          "Fullname": "ODataDemo.DemoService/Suppliers", "Name": "Suppliers"
        }, {
          "Fullname": "ODataDemo.DemoService/Categories", "Name": "Categories"
        }, {
          "Fullname": "ODataDemo.DemoService/Countries", "Name": "Countries"
        }
      ],
      "Singletons": [
        {
          "QualifiedName": "ODataDemo.DemoService/Contoso", "Name": "Contoso"
        }
      ],
      "ActionImports": [],
      "FunctionImports": [
        {
          "QualifiedName": "ODataDemo.DemoService/ProductsByRating",
          "Name": "ProductsByRating",
          "IncludeInServiceDocument": false
        }
      ]
    }
  ]
}
```

15.7 Terms and Annotations

Terms and annotations based on these terms are represented as



A term is identified by its `QualifiedName` property, which is the `Namespace` of the containing schema, followed by a dot (.) and the `Name` of the term.

Example 82:

```
GET ~/ $metadata/Terms?$expand=Type($select=QualifiedName)
```

would return

```
{
  "odata.context": "~/ $metadata/$metadata#Terms (Type (QualifiedName)) ",
  "value": [
    {
      "QualifiedName": "Core.Description", "Name": "Description",
      "DefaultValue": null, "IsCollection": false,
      "Type": { "QualifiedName": "Edm.String" }
    }, {
      "QualifiedName": "Core.OptimisticConcurrencyControl",
      "Name": "OptimisticConcurrencyControl",
      "DefaultValue": null, "IsCollection": false,
      "Type": { "QualifiedName": "Core.OptimisticConcurrencyControlType" }
    }
  ]
}
```

Annotations can be stated in CSDL in two ways: *inline* as child elements of the annotated element, or *externally* as children of an `edm:Annotations` element that targets the model element to be annotated. The external form is only possible for model elements that can be uniquely identified by a target path expression, and these model elements are represented in the Metadata Service as entity types, while all model elements that cannot be targeted are represented as complex types.

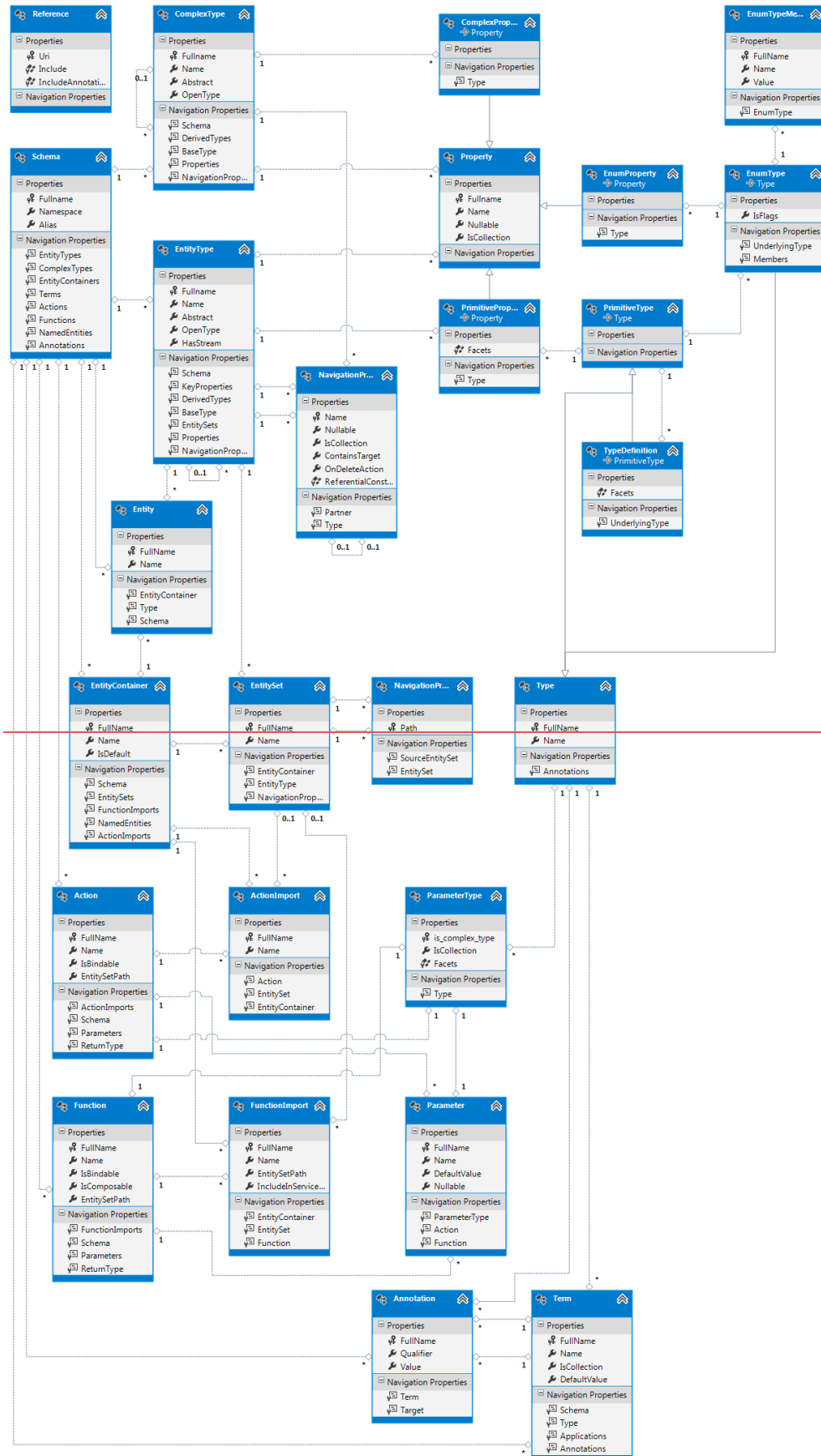
Consequently annotations that can only be stated with the inline form are represented with the complex type `Edm.Metadata.InlineAnnotation`, while annotations that can be stated externally are represented with the entity type `Edm.Metadata.Annotation`, whether they are stated inline or externally in the metadata document or referenced CSDL documents. If the example metadata document in Example 84 would reference the CSDL document in Example 85, all its annotations would also be members of the Annotations entity set of the Metadata Service for Example 84.

These annotations are identified by the combination of their target, term, and qualifier. The `Fullname` value of an annotation is constructed by appending the `Fullname` of the target ~~with~~, followed by an at (@) sign and the `Fullname``QualifiedName` of the term, and for non-empty qualifiers ~~with~~ followed by a hash (#) sign and the qualifier, ~~for example:~~.

Example 83:

```
GET ~/ $metadata/Annotations('SampleModel.Customer@UI.DisplayName#Tablet')
```

The following graphical representation of this schema is incomplete. For example all model elements that can be annotated have a navigation property Annotations to the Annotation entity type but they are only depicted in Schema, Type, and Term to keep the diagram legible:



would return

```
{
  "odata.context": "~/$/metadata/$metadata#Annotations",
  "value": [
    {
      "Fullname": "ODataDemo.Product/Description@Core.IsLanguageDependent",
      "Qualifier": null,
      "Value": { "odata.type": "Meta.ConstantExpression", "Value": true }
    },
    {
      "Fullname": "ODataDemo.Product/Price@UoM.ISOCurrency",
      "Qualifier": null,
      "Value": { "odata.type": "Meta.Path", "Value": "Currency" }
    },
    {
      "Fullname": "ODataDemo.Category/Name@Core.IsLanguageDependent",
      "Qualifier": null,
      "Value": { "odata.type": "Meta.Constant", "Value": true }
    },
    {
      "Fullname": "ODataDemo.DemoService/Suppliers@Core.OptimisticConcurrencyControl",
      "Qualifier": null,
      "Value": {
        "odata.type": "Meta.Record",
        "Annotations": [],
        "PropertyValues": [
          {
            "Annotations": [],
            "Property": "ETagDependsOn",
            "Value": {
              "odata.type": "Meta.Collection",
              "Annotations": [],
              "Items": [
                {
                  "odata.type": "Meta.PropertyPath",
                  "Value": "Concurrency"
                }
              ]
            }
          ]
        ]
      }
    }
  ]
}
```

16 CSDL Examples

Following are two basic examples of valid EDM models as represented in CSDL. These examples demonstrate many of the topics covered above.

16.1 Products and Categories Example

Example 84:

```
<edmx:Edmx xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx"
  Version="4.0">
  <edmx:Reference Uri="http://tinyurl.com/Org-OData-Measures-V1">
    <edmx:Include Alias="UoM" Namespace="Org.OData.Measures.V1" />
  </edmx:Reference>
  <edmx:DataServices>
    <Schema xmlns="http://docs.oasis-open.org/odata/ns/edm"
      Namespace="ODataDemo">
      <EntityType Name="Product" HasStream="true">
        <Key>
          <PropertyRef Name="ID"/>
        </Key>
        <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
        <Property Name="Name" Type="Edm.String" Nullable="true"/>
        <Property Name="Description" Type="Edm.String" Nullable="true"/>
        <Annotation Term="Core.IsLanguageDependent" />
      </EntityType>
      <EntityType Name="Category">
        <Key>
          <PropertyRef Name="ID"/>
        </Key>
        <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
        <Property Name="Name" Type="Edm.String" Nullable="true"/>
        <Annotation Term="Core.IsLanguageDependent" />
      </EntityType>
      <EntityType Name="Supplier">
        <Key>
          <PropertyRef Name="ID"/>
        </Key>
        <Property Name="ID" Type="Edm.Int32" Nullable="false"/>
        <Property Name="Name" Type="Edm.String" Nullable="true"/>
        <Annotation Term="Core.IsLanguageDependent" />
      </EntityType>
      <NavigationProperty Name="Category" Type="ODataDemo.Category"
        Nullable="false" Partner="Products"/>
      <NavigationProperty Name="Supplier" Type="ODataDemo.Supplier"
        Partner="Products"/>
      <NavigationProperty Name="Products" Partner="Category"
        Type="Collection(ODataDemo.Product)"/>
    </Schema>
  </edmx:DataServices>
</edmx:Edmx>
```

```

    <Property Name="ID" Type="Edm.Int32String" Nullable="false"/> />
    <Property Name="Name" Type="Edm.String" Nullable="true"/> />
    <Property Name="Address" Type="ODataDemo.Address" Nullable="false"/> />

    <Property Name="Concurrency" Type="Edm.Int32" Nullable="false"/> />
    <NavigationProperty Name="Products" Partner="Supplier"
        Type="Collection(ODataDemo.Product)" />

</EntityType>
<EntityType Name="Country">
    <Key>
        <PropertyRef Name="Code" />
    </Key>
    <Property Name="Code" Type="Edm.String" MaxLength="2"
        Nullable="false" />
    <Property Name="Name" Type="Edm.String" />
</EntityType>
<ComplexType Name="Address">
    <Property Name="Street" Type="Edm.String" />
    <Property Name="City" Type="Edm.String" />
    <Property Name="State" Type="Edm.String" />
    <Property Name="ZipCode" Type="Edm.String" />
    <Property Name="CountryName" Type="Edm.String" />
    <NavigationProperty Name="Country" Type="ODataDemo.Country">
        <ReferentialConstraint Property="Address/CountryCountryName"
            ReferencedProperty="Name" />
    </NavigationProperty>
</EntityType>
<EntityType Name="Country">
    <Key>
        <PropertyRef Name="Name" />
    </Key>
    <Property Name="Name" Type="Edm.String" />
</EntityType>
<ComplexType Name="Address">
    <Property Name="Street" Type="Edm.String" Nullable="true" />
    <Property Name="City" Type="Edm.String" Nullable="true" />
    <Property Name="State" Type="Edm.String" Nullable="true" />
    <Property Name="ZipCode" Type="Edm.String" Nullable="true" />
    <Property Name="Country" Type="Edm.String" Nullable="true" />
</ComplexType>
<Function Name="ProductsByRating"
    ReturnType="Collection(ODataDemo.Product)">
    <Parameter Name="Rating" Type="Edm.Int32" DefaultValue="4" />
</Function>
<EntityContainer Name="DemoService" IsDefaultEntityContainer="true">
    <EntitySet Name="Products" EntityType="ODataDemo.Product">
        <NavigationPropertyBinding Path="Category"
            EntitySetTarget="Categories" />
        <NavigationPropertyBinding Path="Supplier" EntitySet="Suppliers" />
    </EntitySet>
    <EntitySet Name="Categories" EntityType="ODataDemo.Category">
        <NavigationPropertyBinding Path="Products"
            EntitySetTarget="Products" />
    </EntitySet>
    <EntitySet Name="Suppliers" EntityType="ODataDemo.Supplier">
        <NavigationPropertyBinding Path="Products"
            EntitySetTarget="Products" />
        <NavigationPropertyBinding Path="Address/Country"
            Target="Countries" />
    </EntitySet>
    <Annotation Term="Core.OptimisticConcurrencyControl">
        <Record>
            <PropertyValue Property="ETagDependsOn">
                <Collection>
                    <PropertyPath>Concurrency</PropertyPath>
                </Collection>
            </PropertyValue>
        </Record>
    </Annotation>
</EntityContainer>

```

```

        </Collection>
        </PropertyValue>
    </Record>
</Annotation>
</EntitySet>
<EntitySingleton Name="Contoso" Type="Self.Supplier"/>
">
    <NavigationPropertyBinding Path="Products" Target="Products" />
</Singleton>
<EntitySet Name="Countries" EntityType="ODataDemo.Country"/> />
<FunctionImport Name="ProductsByRating" EntitySet="Products"
    Function="ODataDemo.ProductsByRating"/> />
</EntityContainer>
</Schema>
</edmx:DataServices>
</edmx:Edmx>

```

16.2 Annotated Customers Annotations for Products and Orders Categories Example

Example 85:

```

<edmx:Edmx xmlns:edmx="http://docs.oasis-open.org/odata/ns/edmx"
    Version="4.0">
    <edmx:Reference Uri="http://tinyurl.com/Org-OData-Measures-V1"
        host/service/$metadata">
        <edmx:Include Namespace="Org.OData.Measures.V1 ODataDemo" />
    </edmx:Reference>
    <edmx:Reference Uri="http://somewhere/Vocabulary/V1">
        <edmx:Include Alias="Vocabulary1" Namespace="Some.Vocabulary.V1"/> />
    </edmx:Reference>

```



```

<edmx:DataServices>
  <Schema xmlns="http://docs.oasis-open.org/odata/ns/edm"
    Namespace="Modell" Alias="Self">
<EntityContainer Name="ModellContainer" IsDefaultEntityContainer="true">
<EntitySet Name="CustomerSet" EntityType="Modell.Customer"/>
<EntitySet Name="OrderSet" EntityType="Modell.Order"/>
</EntityContainer>
<Annotations Target="Self.CustomerAnnotations">
<Annotations Target="ODataDemo.Supplier">
<Annotation Term="Vocabulary1.Email">
<Null />
</Annotation>
<Annotation Term="AccountID" Path="AccountNumber"/>
<Annotation Term="Title" String="Customer Info"/>
</Annotations>
<EntityType Name="Customer">
<Key>
<PropertyRef Name="CustomerId"/>
</Key>
<Property Name="CustomerId" Type="Edm.Int32" Nullable="false"/>
<Property Name="FirstName" Type="Edm.String" Nullable="true"/>
<Property Name="LastName" Type="Edm.String" Nullable="true"/>
<Property Name="AccountNumber" Type="Edm.Int32" Nullable="true"/>
<Property Name="Address" Type="Self.Address" Nullable="false"/>
<NavigationProperty Name="Orders" Type="Collection(Self.Order)/>
<Annotation Term="Vocabulary1.PersonVocabulary1.AccountID" Path="ID"
/>
<Annotation Term="Vocabulary1.Title" String="Supplier Info" />
<Annotation Term="Vocabulary1.DisplayName">
<Apply Function="odata.concat">
<Path>Name</Path>
<String> in </String>
<Path>Address/CountryName</Path>
</Apply>
</Annotation>
</Annotations>
<Annotations Target="ODataDemo.Product">
<Record>
<PropertyValue Property="DisplayName">
<Apply Function="odata.concat">
<Path>FirstName</Path>
<String> </String>
<Path>LastName</Path>
</Apply>
</PropertyValue>
<Record>
</Annotation>
</EntityType>
<EntityType Name="Order">
<Key>
<PropertyRef Name="OrderId"/>
</Key>
<Property Name="OrderId" Type="Edm.Int32" Nullable="false"/>
<Property Name="OrderDate" Type="Edm.Int32" Nullable="true"/>
<Property Name="Description" Type="Edm.String" Nullable="true"/>
<NavigationProperty Name="Customer" Type="Self.Customer"
  Nullable="false"/>
<NavigationProperty Name="Product" Type="Self.Product"
  Nullable="false"/>
</EntityType>
<EntityType Name="SalesOrder" BaseType="Self.Order">
<Property Name="Paid" Type="Edm.Boolean" Nullable="false"/>
</EntityType>
<EntityType OpenType="true" Name="Product">

```

```

</Key>
  <PropertyRef Name="ProductId"/>
</Key>
  <Property Name="ProductId" Type="Edm.Int32" Nullable="false"/>
  <Property Name="Name" Type="Edm.String" Nullable="false"/>
  <Property Name="Description" Type="Edm.String" Nullable="true"/>
  <Property Name="Size" Type="Self.Size" Nullable="true"/>
</EntityType>
  <ComplexType Name="Address">
    <Property Name="Street" Type="Edm.String" Nullable="false"/>
    <Property Name="City" Type="Edm.String" Nullable="false"/>
    <Property Name="State" Type="Edm.String" Nullable="false"/>
    <Property Name="Zip" Type="Edm.String" Nullable="false"/>
    <Property Name="Position" Type="Edm.GeographyPoint" Nullable="false"
      SRID="4326"/>
  </ComplexType>
  <TypeDefinition Name="Length" UnderlyingType="Edm.Int32">
    <Annotation Term="Org.OData.Measures.V1.Unit" String="Centimeters"/>
  </TypeDefinition>
  <TypeDefinition Name="Weight" UnderlyingType="Edm.String">
    <Annotation Term="Org.OData.Measures.V1.Unit"
      String="Kilograms"/>
  </TypeDefinition>
  <ComplexType Name="Size">
    <Property Name="Width" Type="Self.Length"/>
    <Property Name="Depth" Type="Self.Length"/>
    <Property Name="Height" Type="Self.Length"/>
    <Property Name="Weight" Type="Self.Weight"/>
  </ComplexType>
  <Annotation Term="Self.Tags">
    <Collection>
      <String>MasterData</String>
    </Collection>
  </Annotation>
</Annotations>
</Schema>
</edmx:DataServices>
</edmx:Edmx>

```

17 Attribute Values

17.1 Namespace

A Namespace is a character sequence ~~conforming to the rule namespace in~~ of type `edm:TNamespaceName`, see ~~[OData-ABNF]~~ **[OData-EDM]**.

Non-normatively speaking it is a dot-separated sequence of ~~SimpleIdentifier~~ **SimpleIdentifiers** with a maximum length of 511 Unicode characters.

17.2 SimpleIdentifier

A SimpleIdentifier is a character sequence ~~conforming to the rule odataIdentifier in~~ **[OData-ABNF]** of type `edm:TSimpleIdentifier`, see **[OData-EDM]**:

```
<xs:simpleType name="TSimpleIdentifier">
  <xs:restriction base="xs:string">
    <xs:maxLength value="128" />
    <xs:pattern
      value="[\p{L}\p{Nl}_][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}"
    />
  </xs:restriction>
</xs:simpleType>
```

Non-normatively speaking it starts with a letter or underscore, followed by at most 127 letters, underscores or digits.

17.3 QualifiedName

For model elements that are direct children of a schema: the namespace or alias of the schema that defines the model element, followed by a dot and the name of the model element, see rule `qualifiedTypeName` in ~~[OData-ABNF]~~ **[OData-ABNF]**.

~~For model elements that are direct children of an entity container: the qualified name of the entity container, followed by a dot and the name of the model element, see rules, `qualifiedActionName` and `qualifiedFunctionName` in [OData-ABNF].~~

For built-in ~~primitive types~~ **primitive types**: the name of the type, prefixed with `Edm` followed by a dot.

17.4 TypeName

~~The QualifiedName~~ **The QualifiedName** of a built-in primitive or abstract type, a type definition, complex type, enumeration type, or entity type, or a collection of one of these types, see rule `qualifiedTypeName` in ~~[OData-ABNF]~~ **[OData-ABNF]**.

The type must be in scope, i.e. the type MUST be defined in the `Edm` namespace or it MUST be defined in the schema identified by the namespace or alias portion of the qualified name, and the identified schema MUST be defined in the same CSDL document or ~~included~~ **included** from a directly ~~referenced~~ **referenced** document.

17.5 TargetPath

Target paths are used in attributes of CSDL elements to refer to other CSDL elements or their nested child elements.

The allowed path expressions are:

- The QualifiedName of a schema child

- The QualifiedName of a schema child followed by a forward slash and name of a child element
- The TargetPath of a complex property of a structured type, followed by a forward slash and the name of a property of the complex property

Example 86: Target expressions

```
Schema.Type
Schema.EntityType/Property
Schema.ComplexType/NavigationProperty
Schema.EntityType/ComplexProperty/NestedComplexProperty/NestedProperty
Schema.EnumType/Member
Schema.EntityContainer
Schema.EntityContainer/EntitySet
Schema.EntityContainer/Singleton
```

17.517.6 Boolean

One of the literals `true` and `false`.

18 Conformance

Conforming services MUST follow all rules of this specification document for the types, sets, ~~operations~~functions, actions, containers and annotations they expose.

Conforming clients MUST be prepared to consume a model that uses any or all of the constructs defined in this specification, including custom annotations ~~defined by the service~~, and MUST ignore any elements or attributes not defined in this version of the specification.

Appendix A. Acknowledgments

The contributions of the OASIS OData Technical Committee members, enumerated in ~~[OData-Protocol]~~**[OData-Protocol]**, are gratefully acknowledged.

Appendix B. Revision History

Revision	Date	Editor	Changes Made
Working Draft 01	2012-08-22	Michael Pizzo	Translated Contribution to OASIS format/template
Committee Specification Draft 01	2013-04-26	Michael Pizzo , Ralf Handl , Martin Zurmuehl	Simplified annotations, relationships, added containment, named-entities singletons Added Type Definitions, Edm.Date, Edm.TimeOfDay, Edm.Duration datatypes. Retired Edm.DateTime, Edm.Time. Enhanced ComplexType support Expanded Service Document Fleshed out descriptions and examples and addressed numerous editorial and technical issues processed through the TC Added Conformance section
Committee Specification Draft 02	2013-07-01	Michael Pizzo , Ralf Handl , Martin Zurmuehl	Restricted services to exactly one entity container Simplified function and action overloads Rounded off annotaitons Fleshed out containment Simplified rules for implicit enum member values Clarified intention of Partner and NavigationPropertyBinding Simplified and completed CSDL for Metadata Service, added description of behavior