[MC-CSDL]:

Conceptual Schema Definition File Format

Revision Summary

Date	Revision History	Revision Class	Comments
2/27/2009	0.1	Major	First Release.
4/10/2009	0.1.1	Editorial	Changed language and formatting in the technical content.
5/22/2009	0.1.2	Editorial	Changed language and formatting in the technical content.
7/2/2009	0.2	Minor	Clarified the meaning of the technical content.
8/14/2009	0.2.1	Editorial	Changed language and formatting in the technical content.
9/25/2009	1.0	Major	Updated and revised the technical content.
11/6/2009	1.0.1	Editorial	Changed language and formatting in the technical content.
12/18/2009	1.0.2	Editorial	Changed language and formatting in the technical content.
1/29/2010	1.1	Minor	Clarified the meaning of the technical content.
3/12/2010	1.1.1	Editorial	Changed language and formatting in the technical content.
4/23/2010	1.1.2	Editorial	Changed language and formatting in the technical content.
6/4/2010	1.1.3	Editorial	Changed language and formatting in the technical content.
7/16/2010	1.2	Minor	Clarified the meaning of the technical content.
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10/8/2010	2.0	Major	Updated and revised the technical content.
11/19/2010	3.0	Major	Updated and revised the technical content.
1/7/2011	4.0	Major	Updated and revised the technical content.
2/11/2011	4.1	Minor	Clarified the meaning of the technical content.
3/25/2011	4.2	Minor	Clarified the meaning of the technical content.
5/6/2011	5.0	Major	Updated and revised the technical content.
6/17/2011	5.1	Minor	Clarified the meaning of the technical content.
9/23/2011	5.1	None	No changes to the meaning, language, or formatting of the technical content.
12/16/2011	6.0	Major	Updated and revised the technical content.
3/30/2012	7.0	Major	Updated and revised the technical content.
7/12/2012	7.0	None	No changes to the meaning, language, or formatting of the technical content.
10/25/2012	8.0	Major	Updated and revised the technical content.
1/31/2013	9.0	Major	Updated and revised the technical content.
8/8/2013	10.0	Major	Updated and revised the technical content.
11/14/2013	10.0	None	No changes to the meaning, language, or formatting of the technical content.

Date	Revision History	Revision Class	Comments
2/13/2014	10.0	None	No changes to the meaning, language, or formatting of the technical content.
5/15/2014	10.0	None	No changes to the meaning, language, or formatting of the technical content.
6/30/2015	11.0	Major	Significantly changed the technical content.
10/16/2015	12.0	Major	Significantly changed the technical content.
7/14/2016	12.0	None	No changes to the meaning, language, or formatting of the technical content.
3/16/2017	13.0	Major	Significantly changed the technical content.
6/1/2017	13.0	None	No changes to the meaning, language, or formatting of the technical content.
3/13/2019	14.0	Major	Significantly changed the technical content.

Table of Contents

1   Introduction

The conceptual schema definition file format provides the structure and semantics of the conceptual schema definition language (CSDL) for the Entity Data Model (EDM). CSDL is a language based on XML that can be used for defining EDM-based conceptual models.

The EDM is an entity-relationship (ER) model. The ER model has existed for more than 30 years and differs from the more familiar relational model, because associations and entities are all first-class concepts.

The EDM defines some well-known primitive types, such as Edm.String, that are used as the building blocks for structural types such as entity types and complex types.

Entities are instances of entity types (for example, customer or employee) that are richly structured records with a key. The structure of an entity type is provided by its properties. An entity key is formed from a subset of the properties of the entity type. The entity key (for example, CustomerId or EmployeeId) is a fundamental concept that is used to uniquely identify and persist entity instances and to allow entity instances to participate in relationships or associations.

Entities are grouped in entity sets; for example, the entity set customers is a set of customer instances.

Associations (occasionally referred to as relationships) are instances of association types. Association types are used to specify a named relationship between two entity types. Thus, an association is a named relationship between two or more entities. Associations are grouped into association sets.

Entity types may include one or more navigation properties. A navigation property is tied to an association type and allows the navigation from one end of an association--the entity type that declares the navigation property--to the other related end, which can be anything from 0 or more related entities. Unlike standard properties, navigation properties are not considered to be structurally part of an entity.

Complex types, which are structural types similar to an entity type, are also supported by the EDM. The main difference is that complex types have no identity and cannot support associations. For these reasons, complex types instances only exist as properties of entity types (or other complex types).

The EDM also supports entity type and complex type inheritance.

Inheritance is a fundamental modeling concept that allows different types to be related in an "Is a" relationship that makes it possible to extend and reuse existing entity types and complex types. When type B inherits from type A, type A is the base-type of B, and B is a sub-type or derived-type of A. The derived-type inherits all the properties of its base-type; these properties are called inherited-properties. The derived-type can be extended to have more properties; these additional properties are called direct-properties. A direct-property name has to be unique; it cannot be the same as an inherited-property name. All valid derived-type instances at all times are also valid base-type instances and can be substituted for the parent instance. In the EDM a derived entity type always inherits the definition of its entity key from its base type.

Function imports are also supported by the EDM. A function import is conceptually similar to a method declaration in a header file, in that a function import defines a function signature, but includes no definition. The parameters and return type of the function import are one of the EDM's built-in primitive types, one of the structural types defined in the rest of the model, or a collection of primitive types and structural types.

Entity sets, association sets, and function imports are grouped into one or more entity containers. Entity containers are conceptually similar to databases; however, because entity types, association types, and complex types are declared outside of an entity container, entity types, association types, and complex types can be re-used across entity containers.

An example of a model that is defined by using CSDL is shown in section 3.

Sections 1.7 and 2 of this specification are normative. All other sections and examples in this specification are informative.

1.1 Glossary

This document uses the following terms:

ADO.NET Entity Framework: A set of technologies that enables developers to create data access applications by programming against the conceptual application model instead of programming directly against a relational storage schema.

alias: A simple identifier that is typically used as a short name for a **namespace**.

alias qualified name: A qualified name that is used to refer to a structural type, with the exception of a namespace that is replaced by the namespace's **alias**. For example, if an entity type called "Person" is defined in the "Model.Store" namespace, and if that namespace's alias is "Self", the alias qualified name for the "Person" entity type is "Self.Person" rather than "Model.Store.Person".

annotation: Any custom, application-specific extension that is applied to an instance of a schema definition language through the use of custom attributes and elements that are not a part of that schema definition language.

association: A named independent relationship between two entity type definitions. Associations in the **Entity Data Model (EDM)** are first-class concepts and are always bidirectional. Indeed, the first-class nature of associations helps distinguish the **EDM** from the relational model. Every association includes exactly two association ends.

cardinality: The measure of the number of elements in a set.

collection: A grouping of one or more **EDM types** that are type compatible.

conceptual schema definition language (CSDL): A language that is based on XML and that can be used to define conceptual models that are based on the **Entity Data Model (EDM)**.

conceptual schema definition language (CSDL) document: A document that contains a conceptual model that is described by using the **CSDL** code.

declared property: A property that is statically declared by a Property element as part of the definition of a structural type. For example, in the context of an EntityType, a declared property includes all properties of an EntityType that are represented by the Property child elements of the EntityType element that defines the EntityType.

derived type: A type that is derived from the BaseType. Only ComplexType and EntityType can define a BaseType.

dynamic property: A designation for an instance of an OpenEntityType that includes additional nullable properties (of a scalar type or ComplexType) beyond its **declared properties**. The set of additional properties, and the type of each, may vary between instances of the same OpenEntityType. Such additional properties are referred to as dynamic properties and do not have a representation in a **CSDL document**.

EDM type: A categorization that includes the following types: **association**, ComplexType, EDMSimpleType, EntityType, and enumeration.

entity: An instance of an EntityType element that has a unique identity and an independent existence. An entity is an operational unit of consistency.

Entity Data Model (EDM): A set of concepts that describes the structure of data, regardless of its stored form.

enumeration type: A type that represents a custom enumeration that is declared by using the EnumType element.

facet: An element that provides information that specializes the usage of a type. For example, the precision (that is, accuracy) **facet** can be used to define the precision of a DateTime property.

identifier: A string value that is used to uniquely identify a component of the **CSDL** and that is of type SimpleIdentifier.

identifiers: The Field or Fields that define the Identity of an EntityInstance. Also referred to as Key.

in scope: A designation that is applied to an XML construct that is visible or can be referenced, assuming that all other applicable rules are satisfied. Types that are in scope include all **scalar types** and structural types that are defined in **namespaces** that are in scope. **Namespaces** that are in scope include the **namespace** of the current **schema** and other **namespaces** that are referenced in the current **schema** by using the Using element.

namespace: A name that is defined on the **schema** and that is subsequently used to prefix **identifiers** to form the **namespace qualified name** of a structural type.

namespace qualified name: A qualified name that refers to a structural type by using the name of the **namespace**, followed by a period, followed by the name of the structural type.

nominal type: A designation that applies to the types that can be referenced. Nominal types include all primitive types and named EDM types. Nominal types are frequently used inline with collection in the following format: collection(nominal_type).

scalar type: A designation that applies to all EDMSimpleType and **enumeration types**. Scalar types do not include structural types.

schema: A container that defines a **namespace** that describes the scope of **EDM types**. All **EDM types** are contained within some **namespace**.

schema level named element: An element that is a child element of the **schema** and contains a Name attribute that must have a unique value.

value term: A term with a single property in EDM.

vocabulary: A schema that contains definitions of **value terms** and entity type terms.

XML namespace: A collection of names that is used to identify elements, types, and attributes in XML documents identified in a URI reference [RFC3986]. A combination of XML namespace and local name allows XML documents to use elements, types, and attributes that have the same names but come from different sources. For more information, see [XMLNS-2ED].

MAY, SHOULD, MUST, SHOULD NOT, MUST NOT: These terms (in all caps) are used as defined in [RFC2119]. All statements of optional behavior use either MAY, SHOULD, or SHOULD NOT.

1.2   References

Links to a document in the Microsoft Open Specifications library point to the correct section in the most recently published version of the referenced document. However, because individual documents in the library are not updated at the same time, the section numbers in the documents may not match. You can confirm the correct section numbering by checking the Errata.

1.2.1 Normative References

We conduct frequent surveys of the normative references to assure their continued availability. If you have any issue with finding a normative reference, please contact dochelp@microsoft.com. We will assist you in finding the relevant information.

[ECMA-334] ECMA, "C# Language Specification", 4th edition, Standard ECMA-334, June 2006, https://www.ecma-international.org/wp-content/uploads/ECMA-334_4th_edition_june_2006.pdf

[MC-EDMX] Microsoft Corporation, "Entity Data Model for Data Services Packaging Format".

[MS-ODATA] Microsoft Corporation, "Open Data Protocol (OData)".

[OGC-SFACA/1.2.1] Open Geospatial Consortium, "OpenGIS Implementation Standard for Geographic information - Simple feature access – Part 1: Common architecture", 06-103r4, version 1.2.1, May 2011, https://portal.opengeospatial.org/files/?artifact_id=25355

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", BCP 14, RFC 2119, March 1997, https://www.rfc-editor.org/rfc/rfc2119.html

[RFC4122] Leach, P., Mealling, M., and Salz, R., "A Universally Unique Identifier (UUID) URN Namespace", RFC 4122, July 2005, http://www.rfc-editor.org/rfc/rfc4122.txt

[XML1.0] Bray, T., Paoli, J., Sperberg-McQueen, C.M., and Maler, E., "Extensible Markup Language (XML) 1.0 (Second Edition)", W3C Recommendation, October 2000, http://www.w3.org/TR/2000/REC-xml-20001006

[XMLNS-2ED] Bray, T., Hollander, D., Layman, A., and Tobin, R., Eds., "Namespaces in XML 1.0 (Second Edition)", W3C Recommendation, August 2006, http://www.w3.org/TR/2006/REC-xml-names-20060816/

[XMLSCHEMA1] Thompson, H., Beech, D., Maloney, M., and Mendelsohn, N., Eds., "XML Schema Part 1: Structures", W3C Recommendation, May 2001, https://www.w3.org/TR/2001/REC-xmlschema-1-20010502/

1.2.2 Informative References

[EPSG] International Association of Oil & Gas Producers, "About the EPSG Dataset", https://epsg.org/home.html

[MS-NETOD] Microsoft Corporation, "Microsoft .NET Framework Protocols Overview".

1.3 Overview

The **conceptual schema definition language (CSDL)** is an XML-based file format that describes the **Entity Data Model (EDM)**. CSDL is based on standards defined in [XML1.0] and [XMLSCHEMA1]. The root of the CSDL is a Schema element. Following that root, these child elements are supported: Using, EntityType, ComplexType, Association, and EntityContainer. In CSDL 2.0 and CSDL 3.0, **Schema** elements can have Function as a child element. **EntityContainer** elements conceptually represent a **DataSource** and can contain EntitySet, AssociationSet, and FunctionImport as child elements. In CSDL 3.0, **Schema** elements can have ValueTerm and Annotations as child elements.

Conceptually, a CSDL file has an overall structure that resembles the following schema.

```
<Schema>
    <Using/>
    <Using/>
    <Annotations />
    <ValueTerm />
```

```
      <EntityType/>
      <EntityType/>
      <ComplexType/>

      <Association/>
      <Association/>
      <Function/>
      <Function/>
      <EntityContainer>
         <EntitySet/>
         <EntitySet/>

         <AssociationSet/>
         <AssociationSet/>

         <FunctionImport/>
         <FunctionImport/>
      </EntityContainer>
      <EntityContainer/>
   </Schema>
```

Note The previous example is not a detailed specification. It is meant to provide only a visual overview.

1.4   Relationship to Protocols and Other Structures

Both Entity Data Model for Data Services Packaging Format [MC-EDMX] and Open Data Protocol [MS-ODATA] use the structures defined in **conceptual schema definition language (CSDL)**.

1.5   Applicability Statement

The **conceptual schema definition language (CSDL)** is an XML format that describes the structure and semantics of the **Entity Data Model (EDM) schemas**. All **identifiers**, such as names, **namespaces**, and so on, are case sensitive.

EDM is a specification for defining conceptual data models. Applications can use the EDM to define a conceptual model that describes the **entity**, relationships, and sets required in the domain served by the application.

1.6   Versioning and Localization

This document describes the following **conceptual schema definition language (CSDL)** versions: CSDL 1.0, CSDL 1.1, CSDL 1.2, CSDL 2.0, and CSDL 3.0. Aspects of later CSDL versions that do not apply to earlier versions are identified in the text.

1.7   Vendor-Extensible Fields

The **conceptual schema definition language (CSDL)** supports application-specific customization and extension through the use of **annotations**. These annotations allow applications to embed application-specific or vendor-specific information into CSDL. The CSDL format does not specify how to process these custom-defined structures or how to distinguish structures from multiple vendors or layers. Parsers of the CSDL can ignore annotations that are not expected or not understood.

Annotations can be of two types: **AnnotationAttribute** and **AnnotationElement**.

An **AnnotationAttribute** is a custom XML attribute applied to a CSDL element. The attribute can belong to any **XML namespace** (as defined in [XMLNS-2ED]) that is not in the list of reserved XML

namespaces for CSDL. Consult the reference for each CSDL element within this document to determine whether **AnnotationAttribute** can be used for that element.

The reserved XML namespaces for CSDL are:

http://schemas.microsoft.com/ado/2006/04/edm

http://schemas.microsoft.com/ado/2007/05/edm

http://schemas.microsoft.com/ado/2008/01/edm

http://schemas.microsoft.com/ado/2008/09/edm

http://schemas.microsoft.com/ado/2009/11/edm

2 Structures

2.1 Elements

2.1.1 Schema

The **Schema** element is the top-level **conceptual schema definition language (CSDL)** construct that allows creation of a **namespace**.

The contents of a namespace can be defined by one or more **Schema** instances. The **identifiers** that are used to name types are unique within a **Namespace**. For instance, an EntityType cannot have the same name as a ComplexType within the same namespace. The **Namespace** forms a part of the type's fully qualified name.

The following is an example of the **Schema** element:

```
<Schema Alias="Model" Namespace="Test.Simple.Model"
xmlns:edm="http://schemas.microsoft.com/ado/2009/11/edm"
xmlns="http://schemas.microsoft.com/ado/2009/11/edm">
```

The following rules apply to the **Schema** element.

- The **CSDL document** MUST have the **Schema** element as its root element.

- The **Namespace** attribute is defined for each **Schema** element. **Namespace** is of type QualifiedName. A namespace is a logical grouping of EntityType elements, ComplexType elements, and Association elements.

- A **schema Namespace** attribute cannot use the values "System", "Transient", or "Edm".

- A schema definition can span across more than one CSDL document.

- The **Alias** attribute can be defined on a **Schema** element. **Alias** is of the type **SimpleIdentifier**.

- **Schema** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **Schema** can contain zero or more of the following child elements. The elements can appear in any given order.

  - Using

  - Association

  - ComplexType

  - EntityType

  - EntityContainer

- In CSDL 2.0 and CSDL 3.0, **Schema** can contain zero or more of the following child elements.

  - **Function**

- **Schema** can contain any number of **AnnotationElement** elements.

- In CSDL 3.0, **Schema** can contain any number of **Annotations** elements.

- In CSDL 3.0, **Schema** can contain any number of **ValueTerm** elements.

- **AnnotationElement** elements MUST appear only after all other child elements of **Schema**.

Element	Schema			
Attributes	**Name**		**Required**	
	Namespace		Yes	
	Alias		No	
	NamespaceUri		No	
	AnnotationAttribute		No	
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**	
			Min	**Max**
	Choice	Using	0	Unbounded
		Association	0	Unbounded
		ComplexType	0	Unbounded
		EntityType	0	Unbounded
		EntityContainer	0	Unbounded
		ValueTerm	0	Unbounded
		Annotations	0	Unbounded
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.2 EntityType

An **entity** is an instance of an **EntityType** element. An **EntityType** has a unique identity, an independent existence, and forms the operational unit of consistency. **EntityType** elements model the top-level concepts within a data model--such as customers, orders, suppliers, and so on (to take the example of a typical line-of-business system). An entity instance represents one particular instance of the **EntityType**, such as a specific customer or a specific order. An **EntityType** can be either abstract or concrete. An abstract **EntityType** cannot be instantiated.

An **EntityType** has a **Name** attribute, a payload consisting of one or more **declared properties**, and an entity Key (section 2.1.5) element that specifies the set of properties whose values uniquely identify an entity within an entity set. An EntityType can have one or more properties of the specified scalar type or ComplexType. A property can be a declared property or a **dynamic property**.

In CSDL 1.2, CSDL 2.0, and CSDL 3.0, an **EntityType** can be an **OpenEntityType**. An **EntityType** is indicated to be an **OpenEntityType** by the presence of an OpenType="true" attribute. If an **EntityType** is an **OpenEntityType**, the set of properties that are associated with the **EntityType** can, in addition to declared properties, include dynamic properties.

Note In CSDL, dynamic properties are defined for use only with **OpenEntityType** instances.

The type of a [Property](#) in an **EntityType** can be a **scalar type** or **ComplexType**. **EntityType** can be categorized as an **EDM type**.

The following is an example of an **EntityType**.

```
<EntityType Name="Customer">
  <Key>
    <PropertyRef Name="CustomerId" />
  </Key>
  <Property Name="CustomerId" Type="Int32" Nullable="false" />
  <Property Name="FirstName" Type="String" Nullable="true" />
  <Property Name="LastName" Type="String" Nullable="true" />
  <Property Name="AccountNumber" Type="Int32" Nullable="true" />
  <NavigationProperty Name="Orders" Relationship="Model1.CustomerOrder" FromRole="Customer"
ToRole="Order" />
</EntityType>
```

The following rules apply to the **EntityType** element:

- **EntityType** MUST have a **Name** attribute defined. The **Name** attribute is of type **SimpleIdentifier** and represents the name of this **EntityType**.

- An **EntityType** is a **schema level named element** and has a unique name.

- **EntityType** can derive from a **BaseType**, which is used to specify the parent type of a **derived type**. The derived type inherits properties from the parent type.

- If a **BaseType** is defined, it has a **namespace qualified name** or an **alias qualified name** of an **EntityType** that is in scope.

- An **EntityType** cannot introduce an inheritance cycle via the **BaseType** attribute.

- An **EntityType** can have its **Abstract** attribute set to "true". By default, the **Abstract** attribute is set to "false".

- An **EntityType** can contain any number of [AnnotationAttribute](#) attributes, but their full names cannot collide.

- An **EntityType** element can contain at most one [Documentation](#) element.

- An **EntityType** either defines an entity **Key** element or derive from a **BaseType**. Derived **EntityType** elements cannot define an entity **Key**. A key forms the identity of the **Entity**.

- An **EntityType** can have any number of **Property** and [NavigationProperty](#) elements in any given order.

- **EntityTypeProperty** child elements are uniquely named within the inheritance hierarchy for the **EntityType**. **Property** child elements and **NavigationProperty** child elements cannot have the same name as their declaring **EntityType**.

- An **EntityType** can contain any number of [AnnotationElement](#) element blocks.

- In CSDL 1.2, CSDL 2.0, and CSDL 3.0, an **EntityType** that represents an **OpenEntityType** MUST have an **OpenType** attribute that is defined with its value equal to "true".

- In CSDL 1.2, CSDL 2.0, and CSDL 3.0, an **EntityType** that derives from an **OpenEntityType** is itself an **OpenEntityType**. Such a derived **EntityType** cannot have an **OpenType** attribute with its value equal to "false", but the derived **EntityType** can have an **OpenType** attribute defined with its value equal to "true".

- In CSDL 3.0, **EntityType** can contain any number of **TypeAnnotation** elements.

- In CSDL 3.0, **EntityType** can contain any number of **ValueAnnotation** elements.

Element	EntityType		
	Name		**Required**
Attributes	Name		Yes
	BaseType		No
	Abstract		No (default=FALSE)
	AnnotationAttribute		No
	OpenType		No

Element	EntityType		
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**
			Min / **Max**
	Documentation		0 / 1
	Key		0 / 1
	Choice	Property	0 / Unbounded
		NavigationProperty	0 / Unbounded
		TypeAnnotation	0 / Unbounded
		ValueAnnotation	0 / Unbounded
	AnnotationElement		0 / Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.3 Property

The **declared properties** of an EntityType element or ComplexType element are defined by using the **Property** element. **EntityType** and **ComplexType** can have **Property** elements. **Property** can be a scalar type or **ComplexType**. A declared property description consists of the declared property's name, type, and a set of **facets**, such as Nullable or Default. Facets describe further behavior of a given type; they are optional to define.

The following is an example of a **Property** element.

```
<Property Name="ProductName" Type="String" Nullable="false" MaxLength="40">
```

The following rules apply to the **Property** element:

- The **Property** MUST define the **Name** attribute.

- The **Property** MUST have the **Type** defined.

- The **Property** type is either a scalar type or a **ComplexType** that is **in scope** and that has a **namespace qualified name** or **alias qualified name**.

- In CSDL 3.0, a **Type** attribute in the **Property** element can have the value "Collection". "Collection" represents a set of non-nullable scalar type instances or **ComplexType** instances. It can be expressed as an attribute (example 1) or by using child element syntax, see

TypeRef (section 2.1.26) (example 2). **TypeRef** is only allowed if the **Type** attribute value is equal to "Collection".

In example 1, **Property** uses a **Type** attribute.

```
<Property Name="AlternateAddresses" Type="Collection(Model.Address)" />
```

In example 2, **Property** uses child element syntax.

```
<Property Name="AlternateAddresses" Type="Collection">
    <TypeRef Type="Model.Address" />
</Property>
```

- **Property** can define a **Nullable** facet. The default value is Nullable=true. In CSDL 1.0, CSDL 1.1, and CSDL 2.0, any **Property** that has a type of **ComplexType** also defines a **Nullable** attribute that is set to "false".

- The following facets are optional to define on **Property**:

  - DefaultValue

  - MaxLength

  - FixedLength

  - Precision

  - Scale

  - Unicode

  - Collation

  - SRID

- In CSDL 1.1, CSDL 1.2, CSDL 2.0, and CSDL 3.0, a **Property** element can define a **CollectionKind** attribute. The possible values are "None", "List", and "Bag".

- **Property** can define ConcurrencyMode. The possible values are "None" and "Fixed". However, for an **EntityType** that has a corresponding **EntitySet** defined, any **EntityType** elements that are derived from the **EntitySet** MUST NOT define any new **Property** with **ConcurrencyMode** set to a value other than "None".

- **Property** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- A **Property** element can contain a maximum of one Documentation element.

- **Property** can contain any number of AnnotationElement elements.

- In CSDL 3.0, **Property** can contain any number of ValueAnnotation elements.

- Child elements of **Property** are to appear in this sequence: **Documentation**, **AnnotationElement**.

Element	Property		
	Name		**Required**
Attributes	Name		Yes
	Type		Yes
	Nullable		No (default=TRUE)
	DefaultValue		No
	MaxLength		No
	FixedLength		No
	Precision		No
	Scale		No
	Unicode		No
	Collation		No
	ConcurrencyMode		No
	AnnotationAttribute		No

Element	Property		
	Name	**Occurrence**	
		Min	**Max**
Child elements MUST appear in this sequence.	Documentation	0	1
	ValueAnnotation	0	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

A dynamic property follows these rules:

- If an instance of an **OpenEntityType** does not include a value for a dynamic property named *N*, the instance is treated as if it includes *N* with a value of "null".

- A dynamic property of an **OpenEntityType** cannot have the same name as a declared property on the same **OpenEntityType**.

2.1.4 NavigationProperty

NavigationProperty elements define non-structural properties on **entities** that allow for navigation from one **Entity** to another via a relationship. Standard properties describe a value that is associated with an entity, while navigation properties describe a navigation path over a relationship. For example, given a relationship between Customer and Order entities, an Order EntityType (section 2.1.2) can describe a **NavigationProperty**"OrderedBy" that represents the Customer instance associated with that particular Order instance.

The following is an example of a **NavigationProperty** element.

```
<NavigationProperty Name="Orders" Relationship="Model1.CustomerOrder" FromRole="Customer"
ToRole="Order" />
```

The following rules apply to the **NavigationProperty** element:

▪ **NavigationProperty** MUST have a **Name** defined.

▪ **NavigationProperty** MUST have a **Relationship** attribute defined.

▪ The **Relationship** attribute can be either a **namespace qualified name** or an **alias qualified name** of an Association (section 2.1.8) element that is **in scope**.

▪ **NavigationProperty** MUST have a **ToRole** attribute defined. **ToRole** specifies the other end of the relationship and refers to one of the role names that is defined on the **Association**.

▪ **NavigationProperty** MUST have a **FromRole** defined. **FromRole** is used to establish the starting point for the navigation and refers to one of the role names that is defined on the **Association**.

▪ **NavigationProperty** can contain any number of **AnnotationAttribute** attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

▪ **NavigationProperty** can contain a maximum of one Documentation element.

▪ **NavigationProperty** can contain any number of AnnotationElement elements.

▪ In CSDL 3.0, **NavigationProperty** can have a **ContainsTarget** defined. When **ContainsTarget** is absent, it defaults to "false". When it is set to "true", **ContainsTarget** indicates containment NavigationProperty (section 2.1.39).

▪ In CSDL 3.0, **NavigationProperty** can contain any number of ValueAnnotation elements.

▪ Child elements of **NavigationProperty** are to appear in this sequence: **Documentation**, **AnnotationElement**.

Element	NavigationProperty		
	Name	**Required**	
	Name	Yes	
	Relationship	Yes	
Attributes	ToRole	Yes	
	FromRole	Yes	
	AnnotationAttribute	No	
	Name	**Occurrence**	
		Min	**Max**
Child elements MUST appear in this sequence.	Documentation	0	1
	ValueAnnotation	0	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.5 Entity Key

A **Key** element describes which **Property** elements form a key that can uniquely identify instances of an **EntityType**. Any set of non-nullable, immutable, **scalar type declared properties** can serve as the key.

The following is an example of the **Key** element.

```
<Key>
  <PropertyRef Name="CustomerId" />
</Key>
```

The following rules apply to the **Key** element:

- **Key** can contain any number of **AnnotationAttribute** attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **Key** MUST have one or more PropertyRef child elements.

- Each **PropertyRef** child element names a Property of a type that is equality comparable.

- In CSDL 2.0 and CSDL 3.0, **Key** can contain any number of AnnotationElement elements.

Element	Key			
Attributes	Name		Required	
	AnnotationAttribute		No	
Child elements	Name		Occurrence	
			Min	Max
	PropertyRef		1	Unbounded
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated.

2.1.6 PropertyRef

PropertyRef element refers to a **declared property** of an EntityType.

The following is an example of **PropertyRef**.

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

The following rules apply to the **PropertyRef** element:

- **PropertyRef** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes MUST NOT collide.

- **PropertyRef** MUST define the **Name** attribute. The **Name** attribute refers to the name of a **Property** defined in the declaring **EntityType**.

- In CSDL 2.0 and CSDL 3.0, **PropertyRef** can contain any number of **AnnotationElement** elements.

Element	PropertyRef		
Attributes	**Name**	**Required**	
	Name	Yes	
	AnnotationAttribute	No	
Child elements	**Name**	**Occurrence**	
		Min	**Max**
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.7 ComplexType

A **ComplexType** element represents a set of related information. Like an EntityType element, a **ComplexType** element consists of one or more properties of scalar type or complex type. However, unlike an **EntityType** element, a **ComplexType** element cannot have an entity Key element or any NavigationProperty elements. **ComplexType** can be categorized as an **EDM type**.

A **ComplexType** element provides a mechanism to create **declared properties** with a rich (structured) payload. Its definition includes its name and payload. The payload of a **ComplexType** is very similar to that of an **EntityType**.

The following is an example of the **ComplexType** element.

```
<ComplexType Name="CAddress">
  <Documentation>
      <Summary>This complextype describes the concept of an Address</Summary>
      <LongDescription>This complextype describes the concept of an Address for use with
Customer and other Entities</LongDescription>
  </Documentation>
  <Property Name="StreetAddress" Type="String">
      <Documentation>
          <LongDescription>StreetAddress contains the string describing the address of the
street associated with an address</LongDescription>
      </Documentation>
  </Property>
  <Property Name="City" Type="String" />
  <Property Name="Region" Type="String" />
  <Property Name="PostalCode" Type="String" />
</ComplexType>
```

The following rules apply to the **ComplexType** element:

- A **ComplexType** MUST have a **Name** attribute defined. **Name** is of type SimpleIdentifier and represents the name of this **ComplexType**.

- **ComplexType** is a **schema level named element** and has a unique name.

- In CSDL 1.1, CSDL 1.2, CSDL 2.0, and CSDL 3.0, a **ComplexType** can derive from a **BaseType**. **BaseType** is either the **namespace qualified name** or **alias qualified name** of another **ComplexType** that is **in scope**.

- A **ComplexType** cannot introduce an inheritance cycle via the **BaseType** attribute.

- In CSDL 1.1, CSDL 1.2, CSDL 2.0, and CSDL 3.0, **ComplexType** can have its **Abstract** attribute set to "true". By default, **Abstract** is set to "false".

- A **ComplexType** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- A **ComplexType** element can contain a maximum of one Documentation element.

- A **ComplexType** can have any number of Property elements.

- In CSDL 1.1, CSDL 1.2, CSDL 2.0, and CSDL 3.0, the property names of a **ComplexType** MUST be uniquely named within the inheritance hierarchy for the **ComplexType**. **ComplexType** properties MUST NOT have the same name as their declaring **ComplexType** or any of its base types.

- **ComplexType** can contain any number of AnnotationElement elements.

- Child elements of **ComplexType** are to appear in this sequence: **Documentation**, **Property**, **AnnotationElement**.

- In CSDL 3.0, **ComplexType** can contain any number of TypeAnnotation elements.

- In CSDL 3.0, **ComplexType** can contain any number of ValueAnnotation elements.

Element	ComplexType		
Attributes	**Name**	**Required**	
	Name	Yes	
	AnnotationAttribute	No	
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	Property	0	Unbounded
	Choice: TypeAnnotation	0	Unbounded
	Choice: ValueAnnotation	0	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.8 Association

An **Association** element defines a peer-to-peer relationship between participating EntityType elements and can support different multiplicities at the two ends. OnDelete operational behavior can be specified at any end of the relationship. An association type can be categorized as an **EDM type**.

An example of an **association** is the relationship between the Customer and Order **entities**. Typically, this relationship has the following characteristics:

- Multiplicity: Each Order is associated with exactly one Customer. Every Customer has zero or more Orders.

- Operational behavior: **OnDelete** Cascade; when an Order with one or more OrderLines is deleted, the corresponding OrderLines also get deleted.

The following is an example of an **Association** element.

```
<Association Name="CustomerOrder">
  <End Type="Model1.Customer" Role="Customer" Multiplicity="1" />
  <End Type="Model1.Order" Role="Order" Multiplicity="*" />
</Association>
```

The following rules apply to the **Association** element:

- **Association** MUST have a **Name** attribute defined. The **Name** attribute is of type SimpleIdentifier.

- An **Association** is a **schema level named element** and has a unique name.

- **Association** can contain any number of AnnotationAttribute attributes. The full names of **AnnotationAttribute** cannot collide.

- An **Association** element can contain a maximum of one Documentation element.

- **Association** MUST have exactly two End elements defined.

- **Association** can have one ReferentialConstraint element defined.

- **Association** can contain any number of AnnotationElement elements.

- Child elements of **Association** are to appear in this sequence: **Documentation**, **End**, **ReferentialConstraint**, **AnnotationElement**.

Element	Association		
Attributes	**Name**	**Required**	
	Name	Yes	
	AnnotationAttribute	No	
Child elements MUST appear in this sequence.	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	End	2	2
	ReferentialConstraint	0	1
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.9 Association End

For a given **Association**, the **End** element defines one side of the relationship. **End** defines what type is participating in the relationship, multiplicity or the **cardinality**, and if there are any operation **associations**, like cascade delete.

The following is an example of an **End** element.

```
          <End Type="Model1.Customer" Role="Customer" Multiplicity="1" />
```

The following rules apply to the **Association End** element:

- **End** MUST define the **EntityType** for this end of the relationship.

- **EntityType** is either a **namespace qualified name** or an **alias qualified name** of an **EntityType** that is **in scope**.

- **End** MUST specify the **Multiplicity** of this end.

- **End** can specify the **Role** name.

- **End** can contain any number of **AnnotationAttribute** attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **End** can contain a maximum of one **Documentation** element.

- At most, one **OnDelete** operation can be defined on a given **End**.

- **End** can contain any number of **AnnotationElement** elements.

- Child elements of **End** are to appear in this sequence: **Documentation**, **OnDelete**, **AnnotationElement**.

Element	End		
	Name	**Required**	
	Type	Yes	
Attributes	Role	No	
	Multiplicity	Yes	
	AnnotationAttribute	No	
	Name	**Occurrence**	
		Min	**Max**
Child elements	Documentation	0	1
	OnDelete	0	1
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.10 OnDelete

The **OnDelete** element is a trigger that is associated with a relationship. The action is performed on one end of the relationship when the state of the other side of the relationship changes.

The following is an example of the **OnDelete** element.

```
    <Association Name="CProductCategory">
      <End Type="Self.CProduct" Multiplicity="*" />
      <End Type="Self.CCategory" Multiplicity="0..1">
        <OnDelete Action="Cascade" />
      </End>
```

```
    </Association>
```

The following rules apply to the **OnDelete** element:

▪   **OnDelete** MUST specify the action.

▪   **OnDelete** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

▪   The **OnDelete** element can contain a maximum of one Documentation element.

▪   **OnDelete** can contain any number of AnnotationElement elements.

▪   Child elements of **OnDelete** are to appear in this sequence: **Documentation**, **AnnotationElement**.

Element	OnDelete			
Attributes	**Name**		**Required**	
	Action		Yes	
	AnnotationAttribute		No	
Child elements	**Name**		**Occurrence**	
			Min	**Max**
	Documentation		0	1
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated.

2.1.11 ReferentialConstraint

In **Entity Data Model (EDM)**, a **ReferentialConstraint** element can exist between the key of one **entity** type and the primitive property or properties of an associated entity type. A referential constraint is a constraint on the keys contained in the **association** type. In CSDL 1.0, CSDL 1.1, and CSDL 1.2, the referential constraint can exist only between the key properties of associated entities.

The two entity types are in a Principal-to-Dependent relationship, which can also be thought of as a type of parent-child relationship. When entities are related by an Association that specifies a referential constraint between the keys of the two entities, the dependent (child) entity object cannot exist without a valid relationship to a principal (parent) entity object.

ReferentialConstraint MUST specify which end is the **PrincipalRole** and which end is the **DependentRole** for the referential constraint.

The following is an example of **ReferentialConstraint**.

```
<Association Name="FK_Employee_Employee_ManagerID">
  <End Role="Employee" Type="Adventureworks.Store.Employee" Multiplicity="1" />
  <End Role="Manager" Type="Adventureworks.Store.Manager" Multiplicity="0..1" />
  <ReferentialConstraint>
    <Principal Role="Employee">
      <PropertyRef Name="EmployeeID" />
    </Principal>
    <Dependent Role="Manager">
      <PropertyRef Name="ManagerID" />
```

```
      </Dependent>
    </ReferentialConstraint>
  </Association>
```

The following rules apply to the **ReferentialConstraint** element:

▪ **ReferentialConstraint** MUST define exactly one **Principal** end role element and exactly one **Dependent** end role element.

▪ **ReferentialConstraint** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

▪ A **ReferentialConstraint** element can contain a maximum of one Documentation element.

▪ **ReferentialConstraint** can contain any number of AnnotationElement elements.

▪ Child elements of **ReferentialConstraint** are to appear in this sequence: **Documentation**, **Principal**, **Dependent**, **AnnotationElement**.

Element	ReferentialConstraint		
Attributes	**Name**	**Required**	
	AnnotationAttribute	No	
Child elements	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	Principal	1	1
	Dependent	1	1
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.12 ReferentialConstraint Role

When defining ReferentialConstraint elements, **Role** MUST be used to indicate which end of the association is the Principal and which end of the relationship is the Dependent. Thus, the **ReferentialConstraint** contains two **Role** definitions: the **Principal** and the **Dependent**.

ReferentialConstraintRole usage conforms to the ordering rules for the child elements of **ReferentialConstraint,** as defined in ReferentialConstraint (section 2.1.11).

The following example of the **ReferentialConstraintRole** defines **Principal** and **Dependent** elements.

```
<ReferentialConstraint>
  <Principal Role="Employee">
    <PropertyRef Name="EmployeeID" />
  </Principal>
  <Dependent Role="Manager">
    <PropertyRef Name="ManagerID" />
  </Dependent>
</ReferentialConstraint>
```

2.1.12.1 Principal

The following example shows the usage of the **PrincipalRole** element in defining a [ReferentialConstraint](#) element.

```
<Principal Role="Employee">
  <PropertyRef Name="EmployeeID" />
</Principal>
```

The following rules apply to the **PrincipalRole** element:

▪ One **PrincipalRole** MUST be used to define the **Principal** end of the **ReferentialConstraint**.

▪ Each **PrincipalRole** specifies one and only one **Role** attribute that is of type [SimpleIdentifier](#).

▪ **Principal** has one or more [PropertyRef](#) elements. Each **PropertyRef** element specifies a name by using the **Name** attribute.

▪ For each **Principal**, a **PropertyRef** definition cannot specify a **Name** value that is specified for another **PropertyRef**.

▪ **PropertyRef** is used to specify the properties that participate in the **PrincipalRole** of the **ReferentialConstraint**.

▪ Each **PropertyRef** element on the **Principal** corresponds to a **PropertyRef** on the [Dependent](#). The **Principal** and the **Dependent** of the **ReferentialConstraint** contains the same number of **PropertyRef** elements. The **PropertyRef** elements on the **Dependent** are listed in the same order as the corresponding **PropertyRef** elements on the **Principal**.

▪ The **Principal** of a **ReferentialConstraint** MUST specify all properties that constitute the **Key** of the **EntityType** that forms the **Principal** of the **ReferentialConstraint**.

▪ The **Multiplicity** of the **PrincipalRole** is 1. For CSDL 2.0 and CSDL 3.0, the **Multiplicity** of the **PrincipalRole** can be 1 or 0.1.

▪ The data type of each property that is defined in the **PrincipalRole** MUST be the same as the data type of the corresponding property that is specified in the **DependentRole**.

▪ In CSDL 2.0 and CSDL 3.0, **Principal** can contain any number of [AnnotationElement](#) elements.

▪ Child elements of **Principal** are to appear in this sequence: **PropertyRef**, **AnnotationElement**.

Element	ReferentialConstraintRoleElement			
Attributes	**Name**	**Required**		
	Role	Yes		
	AnnotationAttribute	No		
Child elements	**Name**	**Occurrence**		
		Min	**Max**	
	PropertyRef	1	Unbounded	
	AnnotationElement	0	Unbounded	

All child elements are to appear in the order indicated.

2.1.12.2 Dependent

The following example shows the usage of the **DependentRole** element in defining a ReferentialConstraint.

```
<Dependent Role="Manager">
  <PropertyRef Name="ManagerID" />
</Dependent>
```

The following rules apply to the **DependentRole** element:

▪ One **DependentRole** MUST be used to define the **Dependent** end of the **ReferentialConstraint**.

▪ Each **DependentRole** MUST specify one and only one **Role** attribute that is of type SimpleIdentifier.

▪ **Dependent** has one or more PropertyRef elements that specify a name by using the **Name** attribute.

▪ For each **Dependent**, a **PropertyRef** definition cannot specify a **Name** value that is specified for another **PropertyRef**.

▪ **PropertyRef** is used to specify the properties that participate in the **DependentRole** of the **ReferentialConstraint**.

▪ Each **PropertyRef** element on the **Principal** corresponds to a **PropertyRef** on the **Dependent**. The **Principal** and the **Dependent** of the **ReferentialConstraint** contain the same number of **PropertyRef** elements. The **PropertyRef** elements on the **Dependent** are listed in the same order as the corresponding **PropertyRef** elements on the **Principal**.

▪ The data type of each property that is defined in the Principal **Role** MUST be the same as the data type of the corresponding property specified in the **DependentRole**.

▪ In CSDL 2.0 and CSDL 3.0, **Dependent** can contain any number of AnnotationElement elements.

▪ Child elements of **Dependent** are to appear in this sequence: **PropertyRef**, **AnnotationElement**.

Element	ReferentialConstraintRoleElement	
Attributes	**Name**	**Required**
	Role	Yes
	AnnotationAttribute	No
Child elements	**Name**	**Occurrence**
		Min	**Max**
	PropertyRef	1	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.13 Using

Using imports the contents of the specified **namespace**. A **schema** can refer to contents of another schema or namespace by importing it by using the **Using** clause. The imported namespace can be associated with an **alias** that is then used to refer to its types, or the types can be directly used by specifying its fully qualified name.

Note Semantically, **Using** is closer to a merge. Unfortunately, the name does not reflect this. If it was truly "using", structures in the schema being used would be unaffected. However, because a dependent schema can derive an **EntityType** from an **EntityType** that is declared in the original schema, this has the potential side-effect of changing what might be found in **EntitySet** elements declared in the schema being used.

The following is an example of the **Using** element.

```
<Using Namespace="Microsoft.Samples.Northwind.Types"
Alias="Types" />
```

The following rules apply to the **Using** element:

- **Using** MUST have a **Namespace** attribute defined that is of type QualifiedName.

- **Using** MUST have an **Alias** attribute defined that is of type SimpleIdentifier. The alias can be used as shorthand for referring to the **Namespace** linked to that alias via the **Using** element.

- **Using** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **Using** can contain a maximum of one Documentation element.

- **Using** can contain any number of AnnotationElement elements.

- If a **Documentation** element is defined, it comes before any **AnnotationElement** elements.

Element	Using		
Attributes	**Name**	**Required**	
	Namespace	Yes	
	Alias	No	
	AnnotationAttribute	No	
Child elements	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.14 EntityContainer

EntityContainer is conceptually similar to a database or data source. It groups EntitySet, AssociationSet, and FunctionImport child elements that represent a data source.

The following is an example of the **EntityContainer** element.

```
<EntityContainer Name="Model1Container" >
  <EntitySet Name="CustomerSet" EntityType="Model1.Customer" />
  <EntitySet Name="OrderSet" EntityType="Model1.Order" />
  <AssociationSet Name="CustomerOrder" Association="Model1.CustomerOrder">
    <End Role="Customer" EntitySet="CustomerSet" />
    <End Role="Order" EntitySet="OrderSet" />
  </AssociationSet>
</EntityContainer>
```

The following rules apply to the **EntityContainer** element:

▪ **EntityContainer** MUST have a **Name** attribute defined that is of type SimpleIdentifier.

▪ **EntityContainer** can define an **Extends** attribute, which, if present, refers to another **EntityContainer** **in scope** by name.

▪ **EntityContainer** elements that extend another **EntityContainer** inherit all of the extended **EntitySet**, **AssociationSet**, and **FunctionImport** child elements from that **EntityContainer**.

▪ **EntityContainer** can contain a maximum of one Documentation element.

▪ **EntityContainer** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

▪ **EntityContainer** can contain any number of **FunctionImport**, **EntitySet**, and **AssociationSet** elements, which can be defined in any order.

▪ **FunctionImport**, **EntitySet**, and **AssociationSet** names within an **EntityContainer** cannot collide.

▪ If present, the **Documentation** child element MUST precede **FunctionImport**, **EntitySet**, and **AssociationSet** child elements.

- In CSDL 2.0 and CSDL 3.0, **EntityContainer** can contain any number of [AnnotationElement](#) elements.

- In CSDL 3.0, **EntityContainer** can contain any number of **ValueAnnotation** elements.

- In the sequence of child elements under **EntityContainer**, **AnnotationElement** follows all other elements.

Element	EntityContainer			
Attributes	**Name**		**Required**	
	Name		Yes	
	Extends		No	
	AnnotationAttribute		No	
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**	
			Min	**Max**
	Documentation		0	1
	Choice	FunctionImport	0	Unbounded
		EntitySet	0	Unbounded
		AssociationSet	0	Unbounded
		ValueAnnotation	0	Unbounded
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.15 FunctionImport

FunctionImport element is used to import stored procedures or functions that are defined in the Store Schema Model into **Entity Data Model (EDM)**.

The following is an example of the **FunctionImport** element.

```
<FunctionImport Name="annualCustomerSales" EntitySet="result_annualCustomerSalesSet"
ReturnType="Collection(Self.result_annualCustomerSales)">
  <Parameter Name="fiscalyear" Mode="In" Type="String" />
</FunctionImport>
```

The following rules apply to the **FunctionImport** element:

- **FunctionImport** MUST have a **Name** attribute defined. **Name** attribute is of type [SimpleIdentifier](#).

- **FunctionImport** can define a **ReturnType** as an attribute.

- In CSDL 3.0, the **ReturnType** can be defined as either an attribute or a child element, but not both.

- If defined in CSDL 1.1, CSDL 2.0, and CSDL 3.0, the type of **ReturnType** MUST be a **scalar type**, [EntityType](#), or [ComplexType](#) that is **in scope** or a **collection** of one of these in-scope types. In CSDL 1.0, the **ReturnType** is collection of either scalar type or **EntityType**.

- Types that are in scope for a **FunctionImport** include all scalar types, **EntityTypes**, and **ComplexTypes** that are defined in the declaring **SchemaNamespace** or in **schemas** that are in scope of the declaring **Schema**.

- If the return type of **FunctionImport** is a collection of **entities**, the **EntitySet** attribute is defined.

- If the return type of **FunctionImport** is of **ComplexType** or scalar type, the EntitySet attribute cannot be defined.

- **FunctionImport** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- The **FunctionImport** element can contain a maximum of one Documentation element.

- **FunctionImport** can have zero or more Parameter elements.

- **Parameter** element names inside a **FunctionImport** cannot collide.

- **FunctionImport** can have an **IsSideEffecting** attribute defined. Possible values are "true" and "false". If the **IsSideEffecting** attribute is omitted, the value of the **IsSideEffecting** attribute defaults to "true".

- **FunctionImport** can have an **IsBindable** attribute defined. Possible values are "true" and "false". If the **IsBindable** attribute is omitted, the value of the **IsBindable** attribute is assumed to be "false".

- When **IsBindable** is set to "true", **FunctionImport** MUST have at least one **Parameter** element defined.

- **FunctionImport** can have an **IsComposable** attribute defined. Possible values are "true" and "false". If the **IsComposable** attribute is omitted, the value of the **IsComposable** attribute is assumed to be "false".

- **FunctionImport** cannot have **IsComposable** set to "true" if **IsSideEffecting** is set to "true".

- In CSDL 2.0 and CSDL 3.0, **FunctionImport** can contain any number of AnnotationElement elements.

- In CSDL 3.0, **FunctionImport** can have an **EntitySetPath** attribute defined. **EntitySetPath** defines the **EntitySet** that contains the entities that are returned by the **FunctionImport** when that **EntitySet** is dependent on one of the **FunctionImport** parameters. For example, the entities returned from a **FunctionImport** can be dependent on the entity set that is passed to the **FunctionImport** as a parameter. In this case, a static **EntitySet** is not sufficient, and an **EntitySetPath** is used. **EntitySetPath** is composed of segments that are separated by a forward slash. The first segment refers to a **FunctionImport** parameter. Each remaining segment represents either navigation, in which case the segment is a **SimpleIdentifier**, or a type cast, in which case the segment is a **QualifiedName**.

- In CSDL 3.0, **FunctionImport** can contain any number of ValueAnnotation elements.

- Child elements of **FunctionImport** are to appear in this sequence: **Documentation** (if present), **ReturnType**, **Parameter**, **AnnotationElement**.

Element	FunctionImport		
Attributes	**Name**	**Required**	
	Name	Yes	
	ReturnType	No	
	EntitySet	No	
	EntitySetPath	No	
	AnnotationAttribute	No	
Child elements MUST appear in this sequence.	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	ReturnType	0	Unbounded
	Parameter	0	Unbounded
	ValueAnnotation	0	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.16 FunctionImport ReturnType

A **ReturnType** describes the shape of data that is returned from a [FunctionImport](#) element. **ReturnType** is used to map to stored procedures with multiple result sets. In CSDL 3.0, the return type of a function import can be declared as a child element.

The following is an example of the **ReturnType** element.

```
<FunctionImport Name="GetOrdersAndProducts">  <ReturnType Type="Collection(Self.Order)"
EntitySet="Orders"/>  <ReturnType Type="Collection(Self.Product)"
EntitySet="Products"/></FunctionImport>
```

The following rules apply to the **FunctionImport ReturnType** element:

▪ **ReturnType** can define type declarations as an attribute.

▪ If defined in CSDL 1.1, CSDL 2.0, or CSDL 3.0, the **Type** of **FunctionImport ReturnType** MUST be an [EDMSimpleType](#), [EntityType](#), or [ComplexType](#) that is **in scope** or a **collection** of one of these in-scope types. In CSDL 1.0, the **ReturnType** is a collection of either **EDMSimpleType** or **EntityType**.

▪ **ReturnType** can contain any number of [AnnotationAttribute](#) attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

▪ The order of the **ReturnType** elements MUST match that of the underlying stored procedure.

Element	ReturnType	
Attributes	**Name**	**Required**
	Type	No
	EntitySet	No
	AnnotationAttribute	No

2.1.17 FunctionImport Parameter

Functions that are defined in **conceptual schema definition language (CSDL)** optionally accept both in and out **Parameter** elements. Each **Parameter** element MUST have an associated **Name** and **Type** defined.

The following is an example of **FunctionImport Parameter** element.

```
<FunctionImport Name="GetScalar" ReturnType="Collection(String)">
  <Parameter Name="count" Type="Int32" Mode="Out" />
  <ValueFunctionImport Anything="bogus1" xmlns="FunctionImportAnnotation"/>
</FunctionImport>
```

The following rules apply to the **FunctionImport Parameter** element:

- **Parameter** MUST have a **Name** defined.

- The **Type** of the **Parameter** MUST be defined. **Type** is a **scalar type**, ComplexType, or EntityType or a **collection** of scalar, **ComplexType**, or **EntityType** types.

- **Parameter** can define the **Mode** of the parameter. Possible values are "In", "Out", and "InOut".

- For a given **Parameter**, a MaxLength value can be specified.

- Precision can be specified for a given **Parameter**.

- Scale can be specified for a given **Parameter**.

- **Parameter** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **Parameter** can contain a maximum of one Documentation element.

- **Parameter** can contain any number of AnnotationElement elements.

- In CSDL 3.0, **Parameter** can contain any number of ValueAnnotation elements.

- Child elements of **Parameter** are to appear in this sequence: **Documentation**, **AnnotationElement**.

Element	Parameter		
	Name	**Required**	
	Name	Yes	
	Type	Yes	
Attributes	Mode	No	
	MaxLength	No	
	Precision	No	
	Scale	No	
	AnnotationAttribute	No	
	Name	**Occurrence**	
		Min	**Max**
Child elements MUST appear in this sequence.	Documentation	0	1
	ValueAnnotation	0	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.18 EntitySet

An **EntitySet** element is a named set that can contain instances of a specified EntityType element and any of the specified **EntityType** subtypes. More than one **EntitySet** for a particular **EntityType** can be defined.

The following is an example of the **EntitySet** element.

```
<EntitySet Name="CustomerSet" EntityType="Model1.Customer" />
```

The following rules apply to the **EntitySet** element:

- **EntitySet** MUST have a **Name** attribute defined that is of type SimpleIdentifier.

- **EntitySet** MUST have an **EntityType** defined.

- The **EntityType** of an **EntitySet** MUST be **in scope** of the Schema that declares the EntityContainer in which this **EntitySet** resides.

- **EntitySet** can have an abstract **EntityType**. An **EntitySet** for a given **EntityType** can contain instances of that **EntityType** and any of its subtypes.

- Multiple **EntitySet** elements can be defined for a given **EntityType**.

- **EntitySet** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **EntitySet** elements can contain a maximum of one Documentation element.

- **EntitySet** can contain any number of AnnotationElement elements.

- In CSDL 3.0, **EntitySet** can contain any number of ValueAnnotation elements.

- Child elements of **EntitySet** are to appear in this sequence: **Documentation**, **AnnotationElement**.

Element	EntitySet		
	Name	**Required**	
Attributes	Name	Yes	
	EntityType	Yes	
	AnnotationAttribute	No	
Child elements MUST appear in this sequence.	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	ValueAnnotation	0	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.19 AssociationSet

An **AssociationSet** contains relationship instances of the specified **association**. The association specifies the EntityType elements of the two end points, whereas **AssociationSet** specifies the EntitySet element that corresponds to either these **EntityType** elements directly or to derived **EntityType** elements. The association instances that are contained in the **AssociationSet** relate **entity** instances that belong to these **EntityType** elements.

The following is an example of the **AssociationSet**.

```
<AssociationSet Name="CustomerOrder" Association="Model1.CustomerOrder">
   <End Role="Customer" EntitySet="CustomerSet" />
   <End Role="Order" EntitySet="OrderSet" />
 </AssociationSet>
```

The following rules apply to the **AssociationSet** element:

- **AssociationSet** MUST have a **Name** attribute defined that is of type SimpleIdentifier.

- **AssociationSet** MUST have an **Association** attribute defined. The **Association** attribute specifies the **namespace qualified name** or **alias qualified name** of the **Association** for which the **AssociationSet** is being defined.

- The **Association** of an **AssociationSet** MUST be **in scope** of the Schema that declares the EntityContainer in which this **AssociationSet** resides.

- **AssociationSet** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- An **AssociationSet** element can contain a maximum of one Documentation element.

- **AssociationSet** MUST have exactly two End child elements defined.

- **AssociationSet** can contain any number of AnnotationElement child elements.

- Child elements of **AssociationSet** are to appear in this sequence: **Documentation**, **End**, **AnnotationElement**.

Element	AssociationSet		
Attributes	**Name**	**Required**	
	Name	Yes	
	Association	Yes	
	AnnotationAttribute	No	
Child elements MUST appear in this sequence.	**Name**	**Occurrence**	
		Min	**Max**
	Documentation	0	1
	End	2	2
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.20 AssociationSet End

The **End** element defines the two sides of the AssociationSet element. This **association** is defined between the two **EntitySets** declared in an EntitySet attribute.

The following is an example of the **End** element.

```
<End Role="Customer" EntitySet="CustomerSet" />
```

The following rules apply to **End** elements inside an **AssociationSet**:

- **End** element can have the **Role** attribute specified. All **End** elements have the **EntitySet** attribute specified.

- The **EntitySet** is the **Name** of an **EntitySet** defined inside the same **EntityContainer**.

- The **Role** of the **End** element MUST map to a **Role** declared on one of the **Ends** of the **Assocation** referenced by the **End** element's declaring AssociationSet.

- Each **End** that is declared by an **AssociationSet** refers to a different **Role**.

- The EntityType for a particular **AssociationSetEnd** is the same as or derived from the **EntityType** that is contained by the related **EntitySet**. An **End** element can contain a maximum of one Documentation element.

- **End** can contain any number of AnnotationElement elements.

- The child elements of **End** are to appear in this sequence: **Documentation**, **AnnotationElement**.

Element	End			
Attributes	**Name**		**Required**	
	Role		No	
	EntitySet		Yes	
	AnnotationAttribute		No	
Child elements	**Name**		**Occurrence**	
			Min	**Max**
	Documentation		0	1
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated.

2.1.21 Documentation

The **Documentation** element is used to provide documentation of comments on the contents of the **conceptual schema definition language (CSDL)** file.

The following is an example of the **Documentation** element on the EntityContainer element.

```
<EntityContainer Name="TwoThreeContainer">
   <Documentation>
      <Summary>Summary: Entity Container for storing Northwind instances</Summary>
      <LongDescription>LongDescription: This Entity Container is for storing Northwind
instances</LongDescription>
   </Documentation>
  <EntitySet Name="Products" EntityType="Self.Product" />
</EntityContainer>
```

The following is an example of the **Documentation** element on the EntitySet element.

```
<EntitySet Name="Products" EntityType="Self.Product">
   <Documentation>
      <Summary>EntitySet Products is for storing instances of EntityType Product</Summary>
      <LongDescription>This EntitySet having name Products is for storing instances of
EntityType Product</LongDescription>
   </Documentation>
</EntitySet>
```

The following is an example of the **Documentation** element on the AssociationSet element and **End** role.

```
<AssociationSet Name="CategoryProducts" Association="Self.CategoryProduct">
    <Documentation>
       <Summary>AssociationSet CategoryProducts is for storing instances of Association
CategoryProduct</Summary>
       <LongDescription>This AssociationSet having name=CategoryProducts is for storing
instances of Association CategoryProduct</LongDescription>
    </Documentation>
  <End Role="Category" EntitySet="Categories">
     <Documentation>
        <Summary>This end of the relationship-instance describes the Category role for
AssociationSet CategoryProducts</Summary>
```

```
            </Documentation>
    </End>
    <End Role="Product" EntitySet="Products">
        <Documentation>
            <LongDescription>This end of the relationship-instance describes the Product role
for AssociationSet CategoryProducts</LongDescription>
        </Documentation>
    </End>
</AssociationSet>
```

The following is an example of the **Documentation** element on the EntityType element, Property element, and NavigationProperty element.

```
<EntityType Name="Product">
    <Documentation>
        <Summary>Summary: EntityType named Product describes the content model for
Product</Summary>
        <LongDescription>LongDescription: The EntityType named Product describes the content
model for Product</LongDescription>
    </Documentation>
    <Key>
        <PropertyRef Name="ProductID" />
    </Key>
    <Property Name="ProductID" Type="Int32" Nullable="false">
        <Documentation>
            <Summary>Summary: This is the key property of EntityType Product</Summary>
            <LongDescription>LongDescription: This is the key property of EntityType
Product</LongDescription>
        </Documentation>
    </Property>
    <Property Name="ProductName" Type="String">
        <Documentation>
            <Summary>Summary: This property describes the name of the Product</Summary>
        </Documentation>
    </Property>
    <Property Name="QuantityPerUnit" Type="String">
        <Documentation>
            <LongDescription>LongDescription: This property describes the quantity per unit
corresponding to a product</LongDescription>
        </Documentation>
    </Property>
    <Property Name="PriceInfo" Nullable="false" Type="Self.PriceInfo" />
    <Property Name="StockInfo" Nullable="false" Type="Self.StockInfo" />
    <NavigationProperty Name="Category" Relationship="Self.CategoryProduct" FromRole="Product"
ToRole="Category">
        <Documentation>
            <Summary>This navigation property allows for traversing to Product-instances
associated with a Category-instance</Summary>
            <LongDescription> </LongDescription>
        </Documentation>
    </NavigationProperty>
</EntityType>
```

The following is an example of the **Documentation** element on the Association element.

```
<Association Name="CategoryProduct">
    <Documentation>
        <Summary>Association CategoryProduct describes the participating end of the
CategoryProduct relationship</Summary>
    </Documentation>
    <End Role="Category" Type="Self.Category" Multiplicity="1">
        <Documentation>
            <Summary>This end of the relationship-instance describes the Category role for
Association CategoryProduct</Summary>
```

```
        </Documentation>
    </End>
    <End Role="Product" Type="Self.Product" Multiplicity="*">
        <Documentation>
            <LongDescription>This end of the relationship-instance describes the Product role
for Association CategoryProduct</LongDescription>
        </Documentation>
    </End>
</Association>
```

The following rules apply to the **Documentation** element:

- **Documentation** can contain any number of [AnnotationAttribute](#) attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **Documentation** can specify a summary of the document inside a **Summary** element.

- **Documentation** can specify a description of the documentation inside a **LongDescription** element.

- The child elements of **Documentation** are to appear in this sequence: **Summary**, **LongDescription**, **AnnotationElement**.

Element	Documentation		
Attributes	**Name**	**Required**	
	AnnotationAttribute	No	
Child elements	**Name**	**Occurrence**	
		Min	**Max**
	Summary	0	1
	LongDescription	0	1
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.22 AnnotationElement

An **AnnotationElement** is a custom XML element that is applied to a **conceptual schema definition language (CSDL)** element. The **AnnotationElement** element and its child elements can belong to any **XML namespace** that is not in the list of reserved XML namespaces for CSDL. Consult the section for each CSDL element within this document to determine whether an **AnnotationElement** can be used for that element.

The following is an example of the **AnnotationElement** element.

```
<EntityType Name="Content">
  <Key>
    <PropertyRef Name="ID" />
  </Key>
  <Property Name="ID" Type="Guid" Nullable="false" />
  <Property Name="HTML" Type="String" Nullable="false" MaxLength="Max" Unicode="true"
    FixedLength="false" />
  <CLR:Attributes>
    <CLR:Attribute TypeName="System.Runtime.Serialization.DataContract"/>
    <CLR:Attribute TypeName="MyNamespace.MyAttribute"/>
```

```
      </CLR:Attributes>
      <RS:Security>
        <RS:ACE Principal="S-0-123-1321" Rights="+R+W"/>
        <RS:ACE Principal="S-0-123-2321" Rights="-R-W"/>
      </RS:Security>
</EntityType>
```

The following rules apply to the **AnnotationElement** element:

▪ The namespace used in **annotations** MUST be declared or the namespace declaration MUST be in-lined with the annotation.

▪ Annotations follow all other child elements. For example, when annotating an EntityType element, the **AnnotationElement** element follows all entity Key, Property, and NavigationProperty elements.

▪ More than one named annotation can be defined per CSDL element.

▪ For a given CSDL element, annotation element names can collide, as long as the combination of namespace plus element name is unique for a particular element.

▪ Annotation is an XML element that contains a valid XML structure.

2.1.23 Model Function

A **Function** element is used to define or declare a user function. These functions are defined as child elements of the Schema element.

The following is an example of the **Function** element.

```
<Function Name="GetAge" ReturnType="Edm.Int32">
    <Parameter Name="Person" Type="Model.Person" />
    <DefiningExpression>
        Edm.DiffYears(Edm.CurrentDateTime(), Person.Birthday)
    </DefiningExpression>
</Function>
```

The following rules apply to the **Function** element:

▪ The **Function** MUST have a **Name** attribute defined that is of type SimpleIdentifier. The **Name** attribute represents the name of this **Function**.

▪ The **Function** MUST define a return type as an attribute or as a child element.

▪ The **Function** cannot contain both an attribute and a child element that defines the return type.

▪ If defined, the type of **FunctionReturnType** MUST be:

   ▪ A scalar type, EntityType, or ComplexType that is **in scope**.

   ▪ A **collection** of one of these scalar, **EntityType**, or **ComplexType** in-scope types.

   ▪ A RowType element or a collection of **RowType** elements that is defined as a child element of **ReturnType**.

   ▪ A ReferenceType element or a collection of **ReferenceType** elements that is defined as a child element of **ReturnType**.

- A single **DefiningExpression** element can be defined for a given **Function**. A **DefiningExpression** is any expression that is intended to be the body of the function. The **conceptual schema definition language (CSDL)** file format does not specify rules and restrictions regarding what language is to be used for specifying function bodies.

- All **Function** parameters have to be inbound.

- **Function** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- Functions are declared as global items inside the **Schema** element.

- **Function** can contain a maximum of one Documentation element.

- The function parameters and return type MUST be of the following types:

  - A **scalar type** or a collection of scalar types.

  - An **entity** type or a collection of entity types.

  - A complex type or a collection of complex types.

  - A row type or a collection of row types.

  - A reference type or a collection of reference types.

- **Function** can contain any number of Parameter elements.

- **Function** can contain any number of AnnotationElement elements.

- In CSDL 3.0, **Function** can contain any number of ValueAnnotation elements.

- **Parameter**, **DefiningExpression**, and **ReturnType** can appear in any order.

- **AnnotationElement** has to be the last in the sequence of elements of a **Function**.

Element	Function			
Attributes	**Name**		**Required**	
	Name		Yes	
	ReturnType		No	
	Abstract		No (default=FALSE)	
	AnnotationAttribute		No	
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**	
			Min	**Max**
	Documentation		0	1
	Choice	Parameter	0	Unbounded
		DefinitionExpression	0	1
		ReturnType	0	1
		ValueAnnotation	0	Unbounded
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.24 Model Function Parameter

Function elements in **conceptual schema definition language (CSDL)** only support inbound parameters. CSDL does not allow setting the **FunctionParameter** mode. It is always set to Mode="In".

The type of a **Parameter** can be declared either as an attribute or as a child element.

The following is an example of the type of a **Parameter** declared as an attribute.

```
<Parameter Name="Age" Type="Edm.Int32"/>
```

The following is an example of the type of a **Parameter** declared as a child element.

```
<Parameter Name="Owner">
    <TypeRef Name="Model.Person" />
</Parameter>
```

The following rules apply to the **Parameter** element:

- **Parameter** MUST have a **Name** attribute defined that is of type <u>SimpleIdentifier</u> and represents the name of this **Parameter**.

- **Parameter** MUST define the type either as an attribute or as a child element.

- **Parameter** can define **facets** if the type is a **scalar type**.

- **Parameter** can contain any number of <u>AnnotationAttribute</u> attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- A function parameter MUST be one of the following types:

  - A scalar type or a **collection** of scalar types.

  - An **entity** type or collection of entity types.

  - A complex type or collection of complex types.

  - A row type or collection of row types.

  - A reference type or collection of reference types.

- **Parameter** can contain a maximum of one <u>CollectionType</u> element.

- **Parameter** can contain a maximum of one <u>ReferenceType</u> element.

- **Parameter** can contain a maximum of one <u>RowType</u> element.

- **Parameter** can contain any number of <u>AnnotationElement</u> elements.

- In CSDL 3.0, **Parameter** can contain any number of <u>ValueAnnotation</u> elements.

- **AnnotationElement** elements are last in the sequence of child elements of a **Parameter**.

Element	Parameter		
	Name		**Required**
Attributes	Name		Yes
	Type		No
	Facets		No
	AnnotationAttribute		No
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**
			Min / **Max**
	Choice	CollectionType	0 / 1
		ReferenceType	0 / 1
		RowType	0 / 1
		ValueAnnotation	0 / Unbounded
	AnnotationElement		0 / Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.25 CollectionType

If the type of the **FunctionParameter** or **ReturnType** is a collection, the type can be expressed as an attribute or by using child element syntax.

The following is an example of the type expressed as an attribute.

```
<Parameter Name="Owners" Type="Collection(Model.Person)" />
```

The following is an example of the type expressed by using child element syntax.

```
<Parameter Name="Owners">
     <CollectionType>
     <TypeRef Name="Model.Person" />
     </CollectionType>
</Parameter>
```

The following rules apply to the **CollectionType** element:

- **CollectionType** MUST define the type either as an attribute or as a child element.

- Attribute syntax can be used only if the **collection** is a **nominal type**.

- **CollectionType** can define **facets** if the type is a **scalar type**. The **Default** facet cannot be applied to a **CollectionType**.

- **CollectionType** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **CollectionType** can define one of the following as a child element:

- CollectionType

- ReferenceType

- RowType

- TypeRef

- **CollectionType** elements can contain any number of AnnotationElement elements.

- **AnnotationElement** is last in the sequence of child elements of **CollectionType**.

Element	CollectionType			
Attributes	**Name**		**Required**	
	ElementType		No	
	Facets		No	
	AnnotationAttribute		No	
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**	
			Min	Max
	Choice	CollectionType	0	1
		ReferenceType	0	1
		RowType	0	1
		TypeRef	0	1
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.26 TypeRef

The **TypeRef** element is used to reference an existing named type.

The following is an example of a **TypeRef** element with the **Name** attribute specified.

```
<TypeRef Type="Model.Person" />
```

The following is an example of a **TypeRef** with **facets** specified.

```
<TypeRef Type="Edm.String" Nullable="true" MaxLength="50"/>
```

The following rules apply to the **TypeRef** element:

- **TypeRef** MUST have a **Type** attribute defined. The **Type** attribute defines the fully qualified name of the referenced type.

- **TypeRef** is used to reference an existing named type. Named types include:

- EntityType

- ▪ ComplexType

- ▪ Primitive type

- ▪ EnumType

- ▪ **TypeRef** can define facets if the type is a **scalar type**. The **Default** facet cannot be applied to a **TypeRef**.

- ▪ **TypeRef** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- ▪ **TypeRef** elements can contain at most one Documentation element.

- ▪ **TypeRef** elements can contain any number of AnnotationElement elements.

- ▪ **AnnotationElement** is last in the sequence of child elements of **TypeRef**.

Element	TypeRef			
Attributes	**Name**		**Required**	
	Type		Yes	
	Facets		No	
	AnnotationAttribute		No	
Child elements	**Name**		**Occurrence**	
			Min	**Max**
	Documentation		0	1
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated.

2.1.27 ReferenceType

ReferenceType is used to specify the reference to an actual **entity** either in the return type or in a parameter definition. The reference type can be specified as an attribute or by using child element syntax.

The following is an example of the **ReferenceType** in a return type.

```
<ReferenceType Type="Model.Person" />
```

The following is an example of the **ReferenceType** in a parameter definition.

```
<ReturnType>
    <CollectionType>
        <ReferenceType Type="Model.Person" />
    </CollectionType>
</ReturnType>
```

The following is an example of the **ReferenceType** as an attribute.

```
<ReturnType Type="Ref(Model.Person)" />
```

The following rules apply to the **ReferenceType** element:

- The **Type** attribute on a **ReferenceType** element MUST always be defined.

- The **Type** of the reference MUST always be of EntityType.

- **ReferenceType** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **ReferenceType** elements can contain at most one Documentation element.

- **ReferenceType** elements can contain any number of AnnotationElement elements.

- **AnnotationElement** is last in the sequence of child elements of **ReferenceType**.

Element	ReferenceType			
Attributes	**Name**		**Required**	
	Type		Yes	
	AnnotationAttribute		No	
Child elements	**Name**		**Occurrence**	
			Min	**Max**
	Documentation		0	1
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated.

2.1.28 RowType

A **RowType** is an unnamed structure. **RowType** is always declared inline.

The following is an example of a **RowType** in a parameter.

```
<Parameter Name="Coordinate" Mode="In">
    <RowType>
        <Property Name="X" Type="int" Nullable="false"/>
        <Property Name="Y" Type="int" Nullable="false"/>
        <Property Name="Z" Type="int" Nullable="false"/>
    </RowType>
</Parameter>
```

The following is an example of a **RowType** defined in a return type.

```
<ReturnType>
    <CollectionType>
        <RowType>
            <Property Name="X" Type="int" Nullable="false"/>
            <Property Name="Y" Type="int" Nullable="false"/>
            <Property Name="Z" Type="int" Nullable="false"/>
        </RowType>
    </CollectionType>
```

```
        </ReturnType>
```

The following rules apply to the **RowType** element:

- **RowType** can contain any number of [AnnotationAttribute](#) attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

- **RowType** MUST contain at least one [Property](#) element.

- **RowType** can contain more than one **Property** element.

- **RowType** can contain any number of [AnnotationElement](#) elements.

- AnnotationElement elements is last in the sequence of child elements of **RowType**.

Element	RowType	
Attributes	Name	Required
	AnnotationAttribute	No
Child elements	Name	Occurrence	
		Min	Max
	Property	1	Unbounded
	AnnotationElement	0	Unbounded

All child elements are to appear in the order indicated.

2.1.29 RowType Property

One or more **Property** elements are used to describe the structure of a [RowType](#) element.

The following is an example of a **RowType** element with two **Property** elements.

```
<ReturnType>
    <CollectionType>
        <RowType>
                <Property Name="C" Type="Customer"/>
                <Property Name="Orders" Type="Collection(Order)"/>
        </RowType>
    </CollectionType>
</ReturnType>
```

The following is an example of a collection of **RowType** elements that contains a collection of **RowType** elements.

```
<ReturnType>
    <CollectionType>
        <RowType>
            <Property Name="Customer" Type="Customer"/>
            <Property Name="Orders">
                <CollectionType>
                    <RowType>
                        <Property Name="OrderNo" Type="Int32"/>
                        <Property Name="OrderDate" Type="Date"/>
                    <RowType>
```

```
            <CollectionType>
        </Property>
    </RowType>
</CollectionType>
</ReturnType>
```

The following rules apply to the **Property** elements of a **RowType** element:

▪ **Property** MUST have a **Name** attribute defined that is of type <u>SimpleIdentifier</u>. The **Name** attribute represents the name of this **Property**.

▪ The type of a property that belongs to a **RowType** MUST be one of the following:

  ▪ **Scalar type**

  ▪ <u>EntityType</u>

  ▪ <u>ReferenceType</u>

  ▪ RowType

  ▪ <u>CollectionType</u>

▪ **Property** defines a type either as an attribute or as a child element.

▪ **Property** cannot contain both an attribute and a child element defining the type of the **Property** element.

▪ **Property** can define **facets** if the type is a scalar type.

▪ **Property** can contain any number of <u>AnnotationAttribute</u> attributes. The full names of the **AnnotationAttribute** attributes cannot collide.

▪ **Property** can contain any number of <u>AnnotationElement</u> elements.

▪ **AnnotationElement** elements are last in the sequence of child elements of **Property**.

Element	Property			
	Name		**Required**	
	Name		Yes	
Attributes	Type		No	
	Facets		No	
	AnnotationAttribute		No	
	Name		**Occurrence**	
			Min	**Max**
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	Choice	CollectionType	0	1
		ReferenceType	0	1
		RowType	0	1
	AnnotationElement		0	Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.30 Function ReturnType

ReturnType describes the shape of data that is returned from a **Function**. The return type of a function can be declared as a **ReturnType** attribute on a **Function** or as a child element.

The following is an example of the return type of a function declared as a **ReturnType** attribute on a **Function**.

```
<Function Name="GetAge" ReturnType="Edm.Int32">
```

The following is an example of the return type of a function declared as a child element.

```
<Function Name="GetAge">
    <ReturnType Type="Edm.Int32" />
</Function>
```

The following rules apply to the **ReturnType** element of a function:

- **ReturnType** MUST define type declaration either as an attribute or as a child element.

- **ReturnType** cannot contain both an attribute and a child element defining the type.

- **ReturnType** can contain any number of AnnotationAttribute attributes. The full names of the **AnnotationAttribute** attributes MUST NOT collide.

- The return type of **Function** MUST be one of the following:

  - A **scalar type** or **collection** of scalar types.

  - An **entity** type or collection of entity types.

  - A complex type or collection of complex types.

  - A row type or collection of row types.

  - A reference type or collection of reference types.

- **ReturnType** can contain a maximum of one CollectionType element.

- **ReturnType** can contain a maximum of one ReferenceType element.

- **ReturnType** can contain a maximum of one RowType element.

- **ReturnType** can contain any number of AnnotationElement elements.

- **AnnotationElement** elements are to be last in the sequence of child elements of **ReturnType**.

Element	ReturnType		
Attributes	**Name**		**Required**
	Type		No
	AnnotationAttribute		No
Child elements MUST appear in this sequence. Within a Choice set, all chosen elements can be arbitrarily ordered.	**Name**		**Occurrence**
			Min / **Max**
	Choice	CollectionType	0 / 1
		ReferenceType	0 / 1
		RowType	0 / 1
	AnnotationElement		0 / Unbounded

All child elements are to appear in the order indicated. For all child elements within a given choice, the child elements can be ordered arbitrarily.

2.1.31 ValueTerm

A **ValueTerm** element is used to define a **value term** in **Entity Data Model (EDM)**.

The following is an example of a **ValueTerm** element.

```
<ValueTerm Name="Title" Type="Edm.String">
```

The following rules apply to the **ValueTerm** element:

- The **ValueTerm** element appears under the Schema element.

- The **ValueTerm** element has a **Name** attribute that is of type SimpleIdentifier. The **Name** of a **ValueTerm** has to be unique across all named elements that are defined in the same **namespace**.

- The **ValueTerm** element MUST have a **Type** attribute. **Type** is of the type ComplexType, primitive type, or EnumType, or a collection of ComplexType or primitive types.

- The **ValueTerm** element can have a **DefaultValue** attribute to provide a value for the **ValueTerm** if the term is applied but has no value specified.

2.1.32 TypeAnnotation

A **TypeAnnotation** element is used to annotate a model element with a term and provide zero or more values for the properties of the term.

The following is an example of the **TypeAnnotation** element.

```
<TypeAnnotation Term="ContactInfo">
    <PropertyValue Property="ContactName" String="ContactName1" />
</TypeAnnotation>
```

The following rules apply to the **TypeAnnotation** element:

- **TypeAnnotation** MUST have a **Term** attribute defined that is a **namespace qualified name**, **alias qualified name**, or SimpleIdentifier.

- **TypeAnnotation** can appear only as a child element of the following elements:

    - ComplexType

    - EntityType

    - Annotations

- **TypeAnnotation** can have a **Qualifier** attribute defined unless the **TypeAnnotation** is a child element of an **Annotations** element that has a **Qualifier** attribute defined. If a **Qualifier** is defined, it has to be a **SimpleIdentifier**. **Qualifier** is used to differentiate bindings based on environmental concerns.

- A **TypeAnnotation** can contain any number of PropertyValue elements.

2.1.33 PropertyValue

A **PropertyValue** element is used to assign the result of an expression to a property of a term.

The following is an example of the **PropertyValue** element.

```
<TypeAnnotation Term="ContactInfo">
    <PropertyValue Property="ContactName" String="ContactName1" />
</TypeAnnotation>
```

The following rules apply to the **PropertyValue** element:

- A **PropertyValue** MUST have a Property attribute defined that is of type SimpleIdentifier. **Property** names the property for which the value is supplied.

- A **PropertyValue** can specify an expression as a child element or as an expression attribute that gives the value of the property.

- A **PropertyValue** can have one of the following expression attributes defined in place of a child element expression. Each of these is equivalent to the same-named expression with the equivalent spelling:

    - Path

    - String

    - Int

    - Float

    - Decimal

    - Bool

    - DateTime

2.1.34 ValueAnnotation

ValueAnnotation is used to attach a named value to a model element.

The following is an example of the **ValueAnnotation** element.

```
<ValueAnnotation Term="Title" String="MyTitle" />
<ValueAnnotation Term="ReadOnly" />
```

The following rules apply to the **ValueAnnotation** element:

▪ The **ValueAnnotation** element MUST have a **Term** attribute defined that is a **namespace qualified name**, **alias qualified name**, or SimpleIdentifier.

▪ The **ValueAnnotation** can appear only as a child element of the following elements:

- Annotations

- Association

- AssociationSet

- ComplexType

- EntityContainer

- EntitySet

- EntityType

- FunctionImport

- FunctionImport Parameter

- Model Function

- Model Function Parameter

- NavigationProperty

- Property

▪ **ValueAnnotation** can have a **Qualifier** attribute defined unless the **ValueAnnotation** is a child element of an Annotations element that has a **Qualifier** attribute defined. If a **Qualifier** is defined, it has to be a **SimpleIdentifier**. **Qualifier** is used to differentiate bindings based on external context.

▪ A **ValueAnnotation** can specify an expression as a child element or as an expression attribute that gives the value of the term.

▪ A **ValueAnnotation** can have one of the following attributes defined in place of a child element expression. Each of these is equivalent to the same-named expression with the equivalent spelling:

- Path

- String

- Int

- Float

- Decimal

- Bool

- DateTime

- If a **ValueAnnotation** has neither a child expression nor an attribute specifying a value, the value of the annotation is the **DefaultValue** specified for the annotation, or **Null** if no **DefaultValue** is specified. Note that a **Null** value for a term is distinct from the absence of a **ValueAnnotation** element for that term, in which case the term has no value.

2.1.35 Annotations

The **Annotations** element is used to group one or more TypeAnnotation or ValueAnnotation elements that target the same model element.

The following is an example of the **Annotations** element.

```
<Annotations Target="Model" Qualifier="Slate">
    <ValueAnnotation Term="Title" String="ShortTitle" />
</Annotations>
```

The following rules apply to the **Annotations** element:

- The **Annotations** element MUST have a **Target** attribute defined. The **Target** attribute names the element to which the contained **TypeAnnotation** and **ValueAnnotation** elements apply. **Target** has to be a **namespace qualified name**, **alias qualified name**, or FunctionImport **Name**.

- The **Target** attribute MUST target one of the following:

    - ComplexType

    - EntitySet

    - EntityType

    - EnumType

    - Function

    - FunctionImport

    - NavigationProperty

    - Parameter

    - Property

    - ValueTerm

    - **Entity Data Model (EDM)** primitive type

- **Annotations** can appear only in Schema level.

- **Annotations** can have a **Qualifier** attribute that is of type SimpleIdentifier.

- **Annotations** MUST contain one or more **TypeAnnotation** or **ValueAnnotation** elements.

2.1.36 Expressions

Expressions are described as core and extended expressions. Core expressions are required to be supported by any **Entity Data Model (EDM)** client.

2.1.36.1   Core Expressions

2.1.36.1.1   Null

Null is an expression that produces an untyped value.

2.1.36.1.2   Primitive Scalar Constant Expressions

The following expression elements are defined as primitive scalar constant expressions:

- **String** allows any sequence of UTF-8 characters.

- **Int** allows content in the following form: [-] [0-9]+.

- **Float** allows content in the following form: [0-9]+ ((.[0-9]+) | [E[+ | -][0-9]+]).

- **Decimal** allows content in the following form: [0-9]+.[0-9]+.

- **Bool** allows content in the following form: true | false.

- **DateTime** allows content in the following form: yyyy-mm-ddThh:mm[:ss[.fffffff]].

- **DateTimeOffset** allows content in the following form: yyyy-mm-ddThh:mm[:ss[.fffffff]]zzzzzz.

- **Guid** allows content in the following form: dddddddd-dddd-dddd-dddd-dddddddddddd where each d represents [A-Fa-f0-9].

- **Binary** allows content in the following form: [A-Fa-f0-9][A-Fa-f0-9]*.

The following is an example of primitive scalar constant expressions.

```
<String>text</String>
<Int>1</Int>
<Float>3.14159265</Float>
<Decimal>9.8</Decimal>
<Bool>true</Bool>
<DateTime>2011-08-30T14:30:00.00</DateTime>
<DateTimeOffset>2011-08-30T14:30:00.00-09:00</DateTimeOffset>
<Guid>707043F1-E7DD-475C-9928-71DA38EA7D57</Guid>
<Binary>6E67616F766169732E65</Binary>
```

2.1.36.1.3   Record Expression

The **Record** expression constructs a record of type EntityType or ComplexType with specified properties.

The following is an example of the **Record** expression element.

```
<Record>
   <PropertyValue Property="Name">
      <String>AuthorName</String>
   </PropertyValue>
   <PropertyValue Property="LastName">
      <String>AuthorLastName</String>
   </PropertyValue>
</Record>
```

The following rule applies to the **Record** expression element:

- The **Record** expression element can have zero or more PropertyValue elements.

2.1.36.1.4   Collection Expression

The **Collection** expression element is used to construct elements with multiple values of specified type.

The **Collection** expression element is used to construct a **collection** of zero or more record expressions or primitive scalar constant expressions.

The following is an example of the **Collection** expression element.

```
<Collection >
    <String>Tag1</String>
    <String>Tag2</String>
    <String>Tag3</String>
</Collection>
```

The following rule applies to the **Collection** expression element:

▪ The **Collection** expression element can have zero or more record expressions or primitive scalar constant expressions.

2.1.36.1.5   LabeledElement Expression

A **LabeledElement** expression is used to assign a name to another expression.

The following is an example of the **LabeledElement** expression.

```
<LabeledElement Name="MyLabel">
    <Int>1</Int>
</LabeledElement>
```

The following rules apply to the **LabeledElement** expression:

▪ **LabeledElement** MUST have **Name** attribute. **Name** is of the type SimpleIdentifier.

▪ **LabeledElement** MUST have one expression element as an attribute or as a child element.

2.1.36.1.6   Path Expression

The **Path** expression element is used to refer to model elements. A **Path** expression can resolve to the following:

▪ A property of an object

▪ An enum constant

▪ An **entity** set

▪ A navigation property

A **Path** expression element can refer to any number of navigation properties that represent an arbitrary depth. Furthermore, a **Path** expression element that refers to a navigation property with a **cardinality** greater than 1 refers to a **collection**.

The following is an example of the **Path** expression element.

```
<ValueAnnotation Term="Title">
    <Path>Customer.FirstName</Path>
```

```
</ValueAnnotation>
```

The following rule applies to the **Path** expression element:

▪ The value of a **Path** expression MUST be of the type [SimpleIdentifier](#) or **QualifiedName**.

2.1.36.2   Extended Expressions

2.1.36.2.1   Apply Expression

The **Apply** expression element is used to apply a function for evaluating a value.

The following is an example of the **Apply** expression element.

```
<ValueAnnotation Term="Email">
   <Apply Function="String.Concat">
     <Path>Alias</Path>
     <String>@Microsoft.com</String>
   </Apply>
</ValueAnnotation>
```

The following rules apply to the **Apply** expression element:

▪ The **Apply** expression element MUST have a **Function** attribute which specifies the function to apply. **Function** is of type **namespace qualified name** or an **alias qualified name**.

▪ The **Apply** expression element can contain zero or more expression elements that specify the arguments of the function.

2.1.36.2.2   If Expression

An **If** expression element is used for conditional evaluations.

The following is an example of the **If** expression element.

```
<ValueAnnotation Term="MyVocabulary.MobilePhone">
    <If>
       <Apply Function="String.Equals">
          <Path>Customer.PhoneType</Path>
          <String>Mobile</String>
       </Apply>
      <Path>Contact.Phone</Path>
      <Null />
    </If>
</ValueAnnotation>
```

The following rules apply to the **If** expression element:

▪ The **If** expression element MUST have three expression elements as child elements with the following rules:

   ▪ The first expression element is interpreted as the test expression and MUST evaluate to a Boolean result.

   ▪ The second expression element is evaluated if the test expression evaluates to true.

   ▪ The third expression element is evaluated if the test expression evaluates to false.

▪ The second and third expression elements MUST be type compatible.

2.1.36.2.3   IsType Expression

An **IsType** expression tests whether a child element expression is of a given type. The result of the **IsType** expression is a Boolean value. The following two examples show how you can use either the **Type** attribute or the [TypeRef](#) child element to test the type.

In example 1, **IsType** uses a **Type** attribute.

```
<IsType Type="Edm.String">
    <String>Tag1</String>
</IsType>
```

In example 2, **IsType** uses a nested **TypeRef** child element.

```
<IsType>
    <TypeRef Type="Edm.String" />
    <String>Tag1</String>
</IsType>
```

The following rules apply to the **IsType** expression:

▪ **IsType** MUST define the type either as an attribute or as a child element **TypeRef**.

▪ **IsType** MUST contain one expression as a child element. The expression MUST follow **TypeRef** if **TypeRef** is used to define the type.

2.1.36.2.4   AssertType Expression

An **AssertType** expression casts a child element expression to a given type. The result of the **AssertType** expression is an instance of the specified type or an error. The following two examples show how you can use either the **Type** attribute or the [ReferenceType](#) child element to assert the type.

In example 1, **AssertType** uses a **Type** attribute.

```
<AssertType Type="Edm.String">
    <String>Tag1</String>
</AssertType>
```

In example 2, **AssertType** uses a nested **ReferenceType** element.

```
<AssertType>
    <ReferenceType Type="Edm.String" />
    <String>Tag1</String>
</AssertType>
```

The following rules apply to the **AssertType** expression:

▪ **AssertType** MUST define the type, either as an attribute or as a child element **ReferenceType**.

▪ **AssertType** MUST contain one expression as a child element. The expression MUST follow **ReferenceType** if **ReferenceType** is used to define the type.

2.1.37 EnumType

An **EnumType** element is used in CSDL 3.0 to declare an **enumeration type**. Enumeration types are **scalar types**.

An enumeration type has a **Name** attribute, an optional **UnderlyingType** attribute, an optional **IsFlags** attribute, and a payload that consists of zero or more declared **Member** elements.

The following is an example of the **EnumType** element.

```
<EnumType Name="ContentType" UnderlyingType="Edm.Int32" IsFlags="true">
   <Member Name="Liquid" Value="1"/>
   <Member Name="Perishable" Value="2"/>
   <Member Name="Edible" Value="4"/>
</EnumType>
```

Enumeration types are equal-comparable, order-comparable, and can participate in **entity** Key elements—that is, they can be the **Key** or can be a part of the **Key**. An enumeration can be categorized as an **EDM type**.

The following rules apply to the **EnumType** element:

- **EnumType** elements MUST specify a **Name** attribute that is of type SimpleIdentifier.

- **EnumType** is a **schema level named element** and has a unique name.

- **EnumType** elements can specify an **UnderlyingType** attribute which is an integral EDMSimpleType, such as SByte, Int16, Int32, Int64, or Byte. **Edm.Int32** is assumed if it is not specified in the declaration.

- **EnumType** elements can specify an **IsFlags** Boolean attribute, which are assumed to be false if it is not specified in the declaration. If the enumeration type can be treated as a bit field, **IsFlags** is set to "true".

- **EnumType** elements can contain a list of zero or more **Member** child elements that are referred to as declared enumeration members.

Element	EnumType		
Attributes	**Name**	**Required**	
	Name	Yes	
	UnderlyingType	No	
	IsFlags	No	
Child elements	**Name**	**Occurrence**	
		Min	**Max**
	Member	0	Unbounded

2.1.38 EnumType Member

A **Member** element is used inside an EnumType element to declare a member of an enumeration type.

The following rules apply to declared enumeration type members:

- **Member** elements MUST specify a **Name** attribute that is unique within the **EnumType** declaration.

- **Member** elements can specify the **Value** attribute that is a valid **Edm.Long**.

- The order of the **Member** elements has meaning and MUST be preserved.

- If the value of the **Member** element is not specified, the value is zero for the first member and one more than the value of the previous member for subsequent members.

- Multiple members with different **Name** attributes can have the same **Value** attributes. When mapping from a value of the underlying type to a **Member** of an **EnumType**, the first matching **Member** is used.

Element	Member	
	Name	**Required**
Attributes	Name	Yes
	Value	No

2.1.39 Containment NavigationProperty

Containment is specified by using a containment NavigationProperty element. A containment **NavigationProperty** is a **NavigationProperty** that has a **ContainsTarget** attribute set to "true".

The EntityType that declares the **NavigationProperty** is the container **EntityType**.

The AssociationType that is specified in the containment **NavigationProperty** is the containment **AssociationType**.

The **EntityType** that is specified on the **End** element of the containment **AssociationType**, with the **Name** that is specified by the containment **NavigationProperty** element's **ToRole** attribute, is the contained **EntityType**.

When the instances of both the contained **entity** and the container entity reside in the same EntitySet, it is called recursive containment.

It MUST NOT be possible for an **EntityType** to contain itself by following more than one containment **NavigationProperty**.

The contained **EntityType** can have a **NavigationProperty** that navigates to the container **EntityType** via the containment **AssociationType**.

The **End** of the containment **AssociationType** that is specified by the **ToRole** attribute of the containment **NavigationProperty** can have any multiplicity.

For nonrecursive containment, the **End** of the containment **AssociationType** that is specified by the **FromRole** attribute of the containment **NavigationProperty** MUST have a multiplicity of '1'.

For recursive containment, the **End** of the containment **AssociationType** that is specified by the **FromRole** attribute of the containment **NavigationProperty** MUST have a multiplicity of '0..1'. The **End** that is specified by the **ToRole** cannot have a multiplicity of '1' because this would lead to endless recursion.

An [AssociationSet](#) has to have the same **EntitySet** on both ends if it is for a containment **AssociationType** that has either the same **EntityType** on both ends or an **EntityType** on one end that derives from the **EntityType** on the other end.

An **EntitySet** cannot be bound by **AssociationSet** to more than one **AssociationType** via a containment **NavigationProperty** that indicates that the **EntityType** (or derived **EntityTypes**) of that **EntitySet** is contained.

Note Because the **EntityType** of an **EntitySet** on an [AssociationSet End](#) has to be the same as or derived from the **EntityTypes** on the corresponding **AssociationType End**, the **EntitySet** MUST be either completely contained or completely noncontained.

2.2 Attributes

2.2.1 EDMSimpleType

The **Entity Data Model (EDM)** attribute defines an abstract type system that defines the primitive types that are listed in the following sections. All **EDMSimpleTypes** are equality comparable unless the specific section below says otherwise. EDMSimpleType can be categorized as an **EDM type**.

2.2.1.1 Commonly Applicable Facets

2.2.1.1.1 Nullable

The **Nullable facet** is a Boolean, which indicates that the **Type** can be null.

2.2.1.1.2 ReadOnly

The **ReadOnly** facet is a Boolean, which indicates whether a property can be changed. If **ReadOnly** is not specified, its value is assumed to be false.

2.2.1.1.3 Default

The **Default** facet is a string. Valid values for this facet depend upon the type that is being referenced. The **Default** facet MUST NOT be applied to a **CollectionType** or **TypeRef**.

Note **ADO.NET Entity Framework** does not support the **Default** facet for an Enum.

2.2.1.2 Binary

The **Binary** data type is used to represent fixed-length or variable-length binary data.

2.2.1.2.1 Facets

The **EDM** simple type facets applicable for the binary type are **FixedLength** and **MaxLength**.

2.2.1.2.1.1   MaxLength

The maximum size of the declared **Binary** data type value is specified by the value of the **MaxLength** facet. The **MaxLength** facet accepts a value of the literal string "Max" or a positive integer with value ranging from 1 to 2^31.

2.2.1.2.1.2   FixedLength

The **FixedLength** facet is a Boolean that specifies whether the length can vary.

2.2.1.3 Boolean

The **Boolean** data type is used to represent the mathematical concept of binary valued logic. There are no applicable facets for this type.

2.2.1.4 DateTime

The **DateTime** type represents date and time with values ranging from 12:00:00 midnight, January 1, 1753 A.D. through 11:59:59 P.M, December 31, 9999 A.D.

2.2.1.4.1 Facets

2.2.1.4.1.1 Precision

The **Precision** facet specifies the degree of granularity of the **DateTime** facet in fractions of a second, based on the number of decimal places that are supported. The actual values allowed will depend on the data provider. As an example, if a database allows a **Precision** of 3, the granularity supported is milliseconds.

2.2.1.5 Time

The **Time** type represents a signed duration of time in terms of days, hours, minutes, seconds, and fractional seconds.

2.2.1.5.1 Facets

2.2.1.5.1.1 Precision

The **Precision** facet specifies the degree of granularity of the **Time** type in fractions of a second, based on the number of decimal places that are supported. The actual values allowed will depend on the data provider. As an example, if a database allows a Precision of 3, the granularity supported is milliseconds.

2.2.1.6 DateTimeOffset

The **DateTimeOffset** type represents date and time as an Offset in minutes from GMT, with values ranging from 12:00:00 midnight, January 1, 1753 A.D. through 11:59:59 P.M, December 31, 9999 A.D.

2.2.1.6.1 Facets

2.2.1.6.1.1 Precision

The **Precision** facet specifies the degree of granularity of the **DateTimeOffset** type in fractions of a second, based on the number of decimal places that are supported. For example, a **Precision** of 3 means that the granularity supported is milliseconds.

2.2.1.7 Decimal

The **Decimal** type represents numeric values with fixed precision and scale. The required precision and scale can be specified using its optional **Precision** and **Scale** facets. The Decimal type can describe a numeric value ranging from negative $10^{255} + 1$ to positive $10^{255} - 1$.

2.2.1.7.1 Facets

2.2.1.7.1.1   Precision

The **Precision** facet is a positive integer that specifies the maximum number of decimal digits that an instance of the decimal type can have, both to the left and to the right of the decimal point.

2.2.1.7.1.2   Scale

This is a positive integer that specifies the maximum number of decimal digits to the right of the decimal point that an instance of this type can have. The **Scale** value can range from 0 through the specified **Precision** value. The default **Scale** is 0.

2.2.1.8 Single

The **Single** type represents a floating point number with 7 digits precision that can represent values with approximate range of ± 1.18e -38 through ± 3.40e +38.

2.2.1.9 Double

The **Double** type represents a floating point number with 15 digits precision that can represent values with approximate range of ± 2.23e -308 through ± 1.79e +308.

2.2.1.10   Guid

This **Guid** type, as specified in [RFC4122], represents a 16-byte (128-bit) unique identifier value.

2.2.1.11   SByte

The **SByte** type represents a signed 8-bit integer value.

2.2.1.12   Int16

The **Int16** type represents a signed 16-bit integer value.

2.2.1.13   Int32

The **Int32** type represents a signed 32-bit integer value.

2.2.1.14   Int64

The **Int64** type represents a signed 64-bit integer value.

2.2.1.15   Byte

The **Byte** type represents an unsigned 8-bit integer value.

2.2.1.16   String

The **String** type represents fixed-length or variable-length character data. The **EDMSimpleType** facets applicable to **String** type are described below.

2.2.1.16.1   Facets

The **EDMSimpleType** facets that are applicable for the **String** type are Unicode, Collation, FixedLength, and MaxLength. The facets Unicode and Collation are optional.

2.2.1.16.1.1 Unicode

The **Unicode** facet is a Boolean value. This value, when set to true, dictates the **String** type that an instance will store. By default, UNICODE characters are used, otherwise standard ASCII encoding is used. The default value for this facet is true.

Note The **String** data type does not support the kind of UNICODE to be specified, leaving it to the concrete type systems hosting **EDM** to choose the appropriate UNICODE type.

2.2.1.16.1.2 FixedLength

The **FixedLength** facet is a Boolean value. The Boolean value specifies whether the store requires a string to be fixed length or not (that is, setting this facet to true would require a fixed-length field [char or nchar] instead of variable-length [varchar or nvarchar]).

2.2.1.16.1.3 MaxLength

The **MaxLength** facet specifies the maximum length of an instance of the **String** type. The **MaxLength** facet accepts a value of the literal string "Max" or a positive integer. For **Unicode** equal to true, **MaxLength** can range from 1 to 2^{30}, or if false, **MaxLength** can range from 1 to 2^{31}.

2.2.1.16.1.4 Collation

The **Collation** facet is a string value that specifies the collating sequence (or sorting sequence) to be used for performing comparison and ordering operations over string values.

The collating sequence for the applicable data types is as follows:

- Binary

- Boolean

- Byte

- DateTime

- DateTimeOffset

- Time

- Decimal

- Double

- Single

- Guid

- Int16

- Int32

- Int64

- String

- SByte

2.2.1.17 Stream

The **Stream** data type is used to represent fixed-length or variable-length data stream.

2.2.1.17.1 Facets

The **EDMSimpleType** facets applicable for the **String** data type are FixedLength and MaxLength.

2.2.1.18 Geography

The **Geography** type represents any geospatial data type that uses a geographic (round-earth) coordinate system. Each entity's data can be of any of the geographic primitive types; **Geography** acts as an abstract base class for those types. The subclasses of **Geography** are **GeographyPoint**, **GeographyLineString**, **GeographyPolygon**, **GeographyCollection**, **GeographyMultiPoint**, **GeographyMultiLineString**, and **GeographyMultiPolygon**. **Geography** is not equality comparable, so it cannot be used in keys.

Geography is not an instantiable type. An entity can declare a property to be of type **Geography**. An instance of an entity MUST NOT have a value of type **Geography**. Each value MUST be of some subtype.

2.2.1.18.1 Facets

The **EDMSimpleType** facets applicable for the **Geography** type are **SRID**. SRID is optional.

2.2.1.18.1.1 SRID

The **SRID** facet is an Int value. This value corresponds to the System Reference Identifier for the coordinate system that is used. The valid values and their meanings are as defined by the European Petroleum Survey Group (EPSG) [EPSG]. If SRID is not specified, the default value of 4326 is assumed, which corresponds to the WGS 84 datum.

SRID can also have the special value "variable". This means that the SRID is explicitly stated to vary per entity instance.

2.2.1.19 GeographyPoint

The **GeographyPoint** type represents a single position in a geographic (round-earth) coordinate system. **GeographyPoint** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyPoint** is as the meaning of **Point** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.4), but for ellipsoidal coordinates.

2.2.1.19.1 Facets

All facets for the **GeographyPoint** type behave exactly as for its base type, **Geography**.

2.2.1.20 GeographyLineString

The **GeographyLineString** type represents a path in a geographic (round-earth) coordinate system. **GeographyLineString** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyLineString** is as the meaning of **LineString** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.7), except that interpolation between control points is defined to be along great elliptic arcs.

2.2.1.20.1 Facets

All facets for **GeographyLineString** behave exactly as for its base type, **Geography**.

2.2.1.21 GeographyPolygon

The **GeographyPolygon** type represents a surface in a geographic (round-earth) coordinate system. **GeographyPolygon** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyPolygon** is as the meaning of **Polygon** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.11), except for ellipsoidal coordinates.

2.2.1.21.1 Facets

All facets for **GeographyPolygon** behave exactly as for its base type, **Geography**.

2.2.1.22 GeographyCollection

The **GeographyCollection** type represents a **Geography** that is defined as the union of a set of **Geography** instances. **GeographyCollection** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyCollection** is as the meaning of **GeometryCollection** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.3), but for ellipsoidal coordinates.

2.2.1.22.1 Facets

All facets for **GeographyCollection** behave exactly as for its base type, **Geography**.

2.2.1.23 GeographyMultiPoint

The **GeographyMultiPoint** type represents a **Geography** that is defined as the union of a set of **GeographyPoint** instances. **GeographyMultiPoint** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyMultiPoint** is as the meaning of **MultiPoint** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.5), but for ellipsoidal coordinates.

2.2.1.23.1 Facets

All facets for **GeographyMultiPoint** behave exactly as for its base type, **Geography**.

2.2.1.24 GeographyMultiLineString

The **GeographyMultiLineString** type represents a **Geography** that is defined as the union of a set of **GeographyLineString** instances. **GeographyMultiLineString** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyMultiLineString** is as the meaning of **MultiLineString** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.9), but for ellipsoidal coordinates.

2.2.1.24.1 Facets

All facets for **GeographyMultiLineString** behave exactly as for its base type, **Geography**.

2.2.1.25 GeographyMultiPolygon

The **GeographyMultiPolygon** type represents a **Geography** that is defined as the union of a set of **GeographyPolygon** instances. **GeographyMultiPolygon** is not equality comparable, so it cannot be used in keys. The meaning of a **GeographyMultiPolygon** is as the meaning of **MultiPolygon** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.14), but for ellipsoidal coordinates.

2.2.1.25.1 Facets

All facets for **GeographyMultiPolygon** behave exactly as for its base type, **Geography**.

2.2.1.26 Geometry

The **Geometry** type represents any geospatial data type that uses a geometric (flat-earth) coordinate system. Each entity's data can be of any of the geometric primitive types; **Geometry** acts as an abstract base class for those types. The subclasses of **Geometry** are **GeometryPoint**, **GeometryLineString**, **GeometryPolygon**, **GeometryCollection**, **GeometryMultiPoint**, **GeometryMultiLineString**, and **GeometryMultiPolygon**. **Geometry** is not equality comparable, so it cannot be used in keys.

Geometry is not an instantiable type. An entity can declare a property to be of type **Geometry**. An instance of an entity MUST NOT have a value of type **Geometry**. Each value MUST be of some subtype.

2.2.1.26.1 Facets

The EDM simple type facets applicable for this type are **SRID**. **SRID** is optional.

2.2.1.26.1.1 SRID

The **SRID** facet is an Int value. This value corresponds to the System Reference Identifier for the coordinate system that is used. The valid values and their meanings are as defined by the European Petroleum Survey Group (EPSG) [EPSG]. If SRID is not specified, the default value of 0 is assumed, which corresponds to a unitless planar coordinate system without a defined origin.

SRID can also have the special value "variable". This means that the SRID is explicitly stated to vary per entity instance.

2.2.1.27 GeometryPoint

The **GeometryPoint** type represents a single position in a geometric (flat-earth) coordinate system. **GeometryPoint** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryPoint** is as the meaning of **Point** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.4).

2.2.1.27.1 Facets

All facets for **GeometryPoint** behave exactly as for its base type, **Geometry**.

2.2.1.28 GeometryLineString

The **GeometryLineString** type represents a path in a geometric (flat-earth) coordinate system. **GeometryLineString** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryLineString** is as the meaning of **LineString** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.7).

2.2.1.28.1 Facets

All facets for **GeometryLineString** behave exactly as for its base type, **Geometry**.

2.2.1.29 GeometryPolygon

The **GeometryPolygon** type represents a surface in a geometric (flat-earth) coordinate system. **GeometryPolygon** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryPolygon** is as the meaning of **Polygon** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.11).

2.2.1.29.1 Facets

All facets for **GeometryPolygon** behave exactly as for its base type, **Geometry**.

2.2.1.30   GeometryCollection

The **GeometryCollection** type represents a **Geometry** that is defined as the union of a set of **Geometry** instances. **GeometryCollection** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryCollection** is as the meaning of **GeometryCollection** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.3).

2.2.1.30.1   Facets

All facets for **GeometryCollection** behave exactly as for its base type, **Geometry**.

2.2.1.31   GeometryMultiPoint

The **GeometryMultiPoint** type represents a **Geometry** that is defined as the union of a set of **GeometryPoint** instances. **GeometryMultiPoint** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryMultiPoint** is as the meaning of **MultiPoint** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.5).

2.2.1.31.1   Facets

All facets for **GeometryMultiPoint** behave exactly as for its base type, **Geometry**.

2.2.1.32   GeometryMultiLineString

The **GeometryMultiLineString** type represents a **Geometry** that is defined as the union of a set of **GeometryLineString** instances. **GeometryMultiLineString** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryMultiLineString** is as the meaning of **MultiLineString** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.9).

2.2.1.32.1   Facets

All facets for **GeometryMultiLineString** behave exactly as for its base type, **Geometry**.

2.2.1.33   GeometryMultiPolygon

The **GeometryMultiPolygon** type represents a **Geometry** that is defined as the union of a set of **GeometryPolygon** instances. **GeometryMultiPolygon** is not equality comparable, so it cannot be used in keys. The meaning of a **GeometryMultiPolygon** is as the meaning of **MultiPolygon** in the OGC Simple Features specification ([OGC-SFACA/1.2.1] section 6.1.14).

2.2.1.33.1   Facets

All facets for **GeometryMultiPolygon** behave exactly as for its base type, **Geometry**.

2.2.2   Action

Action can either be "Cascade" or "None".

The cascade action implies that the operation to delete an **entity** deletes the relationship instance and then applies the action on the entity-instance at the other end of the relationship. For example, when a Customer is deleted, the cascade action specifies to delete all Orders that belong to that Customer.

2.2.3 Multiplicity

The **Multiplicity** of a relationship describes the **cardinality** or number of instances of an EntityType that can be associated with the instances of another **EntityType**.

The possible types of multiplicity are as follows: one-to-one, one-to-many, zero-one to one, zero-one to many, and many-to-many.

2.2.4 ConcurrencyMode

ConcurrencyMode is a special facet that can be applied to any primitive **Entity Data Model (EDM)** type. Possible values are "None", which is the default, and "Fixed".

When used on an EntityType property, **ConcurrencyMode** specifies that the value of that **declared property** is used for optimistic concurrency checks. Essentially, declared properties marked with a fixed **ConcurrencyMode** become part of a **ConcurrencyToken**.

The following rules apply to **ConcurrencyMode**:

- The property's type MUST be a simple type. It cannot be applied to properties of a ComplexType.

- The property MUST be a declared property.

2.2.5 QualifiedName

QualifiedName is a string-based representation of the name of the element or attribute.

The following pattern represents the allowed **identifiers** for **QualifiedName**.

```
Value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}"
```

2.2.6 SimpleIdentifier

SimpleIdentifier is a string-based representation. The maximum length of the **identifier** MUST be less than 480.

The following pattern represents the allowed identifiers in the ECMA specification as specified in [ECMA-334] sections 9.4.2 and A.1.6.

```
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}"
```

2.2.7 AnnotationAttribute

An **AnnotationAttribute** is a custom XML attribute that is applied to a **CSDL** element. The attribute can belong to any **XML namespace** (as defined in [XMLNS-2ED]) that is not in the list of reserved XML namespaces for CSDL. Consult the reference for each CSDL element within this document to determine whether **AnnotationAttribute** can be used for that element.

2.2.8 OpenType

OpenType is a facet that can be applied to any EntityType. Possible values are "false", which is the default, and "true".

EntityType elements marked with OpenType="false" or **EntityType** elements that do not explicitly include an **OpenType** attribute indicate that the element defines an **EntityType**. **EntityType** elements marked with OpenType="true" indicate that the element defines an **OpenEntityType**.

2.2.9 TypeTerm

TypeTerm is a base type that is used to define **vocabulary** terms.

2.3 Facet Application

Facets apply to the nominal type referenced in the element where the facet is declared. In the following example, the **Nullable** facet applies to the **DateTime** referenced type.

```
<Property Name="SuggestedTimes" Type="Collection(DateTime)" Nullable="true" />
```

In the following example, the **Nullable** facet can only be placed on the child element that references the **DateTime** type. Facets cannot be applied to **Collection** type references.

```
<ReturnType>
      <CollectionType TypeRef="DateTime" Nullable="true" />
</ReturnType>
```

3   Structure Examples

The following example shows a **conceptual schema definition language (CSDL)** that defines:

- Customer, Order, and Product **entity** types.

- **Association** (CustomerOrder) that associates Customer and Order entity types.

- SalesOrder entity type that has Order as the **BaseType**.

- Address complex type.

```xml
<Schema xmlns="http://schemas.microsoft.com/ado/2009/11/edm" Namespace="Model1" Alias="Self">
  <EntityContainer Name="Model1Container" >
    <EntitySet Name="CustomerSet" EntityType="Model1.Customer" />
    <EntitySet Name="OrderSet" EntityType="Model1.Order" />
    <AssociationSet Name="CustomerOrder" Association="Model1.CustomerOrder">
      <End Role="Customer" EntitySet="CustomerSet" />
      <End Role="Order" EntitySet="OrderSet" />
    </AssociationSet>
  </EntityContainer>
  <EntityType Name="Customer">
    <Key>
      <PropertyRef Name="CustomerId" />
    </Key>
    <Property Name="CustomerId" Type="Int32" Nullable="false" />
    <Property Name="FirstName" Type="String" Nullable="true" />
    <Property Name="LastName" Type="String" Nullable="true" />
    <Property Name="AccountNumber" Type="Int32" Nullable="true" />
    <Property Name="Address" Type="Self.Address" Nullable="false" />
    <NavigationProperty Name="Orders" Relationship="Model1.CustomerOrder" FromRole="Customer"
ToRole="Order" />
  </EntityType>
  <EntityType Name="Order">
    <Key>
      <PropertyRef Name="OrderId" />
    </Key>
    <Property Name="OrderId" Type="Int32" Nullable="false" />
    <Property Name="OrderDate" Type="Int32" Nullable="true" />
    <Property Name="Description" Type="String" Nullable="true" />
    <NavigationProperty Name="Customer" Relationship="Model1.CustomerOrder" FromRole="Order"
ToRole="Customer" />
  </EntityType>
  <EntityType Name="SalesOrder" BaseType="Self.Order">
    <Property Name="Paid" Type="Boolean" Nullable="false" />
  </EntityType>
  <EntityType OpenType="true" Name="Product">
    <Key>
      <PropertyRef Name="ProductId" />
    </Key>
    <Property Name="ProductId" Type="Int32" Nullable="false" />
    <Property Name="Name" Type="String" Nullable="false" />
    <Property Name="Description" Type="String" Nullable="true" />
  </EntityType>
  <Association Name="CustomerOrder">
    <End Type="Model1.Customer" Role="Customer" Multiplicity="1" />
    <End Type="Model1.Order" Role="Order" Multiplicity="*" />
  </Association>
  <ComplexType Name="Address">
    <Property Name="Street" Type="String" Nullable="false" />
    <Property Name="City" Type="String" Nullable="false" />
    <Property Name="State" Type="String" Nullable="false" />
    <Property Name="Zip" Type="String" Nullable="false" />
    <Property Name="Position" Type="GeographyPoint" Nullable="false" SRID="4326" />
  </ComplexType>
</Schema>
```

3.1 ValueAnnotation

The following examples show a **conceptual schema definition language (CSDL)** in which Model1 is extended with [ValueAnnotation](#).

```xml
<Schema xmlns="http://schemas.microsoft.com/ado/2009/11/edm" Namespace="Model1" Alias="Self">
  <Using Alias="Vocabulary1" Namespace="Vocabulary1" />
  <EntityContainer Name="Model1Container" >
    <EntitySet Name="CustomerSet" EntityType="Model1.Customer" />
    <EntitySet Name="OrderSet" EntityType="Model1.Order" />
    <AssociationSet Name="CustomerOrder" Association="Model1.CustomerOrder">
      <End Role="Customer" EntitySet="CustomerSet" />
      <End Role="Order" EntitySet="OrderSet" />
    </AssociationSet>
  </EntityContainer>
  <Annotations Target="Self.Customer">
    <ValueAnnotation Term="Vocabulary1.EMail">
      <Null />
    </ValueAnnotation>
    <ValueAnnotation Term="AccountID" Path="AccountNumber" />
    <ValueAnnotation Term="Title" String="Customer Info"/>
  </Annotations>
  <EntityType Name="Customer">
    <Key>
      <PropertyRef Name="CustomerId" />
    </Key>
    <Property Name="CustomerId" Type="Int32" Nullable="false" />
    <Property Name="FirstName" Type="String" Nullable="true" />
    <Property Name="LastName" Type="String" Nullable="true" />
    <Property Name="AccountNumber" Type="Int32" Nullable="true" />
    <Property Name="Address" Type="Self.Address" Nullable="false" />
    <NavigationProperty Name="Orders" Relationship="Model1.CustomerOrder" FromRole="Customer"
 ToRole="Order" />
  </EntityType>
  <EntityType Name="Order">
    <Key>
      <PropertyRef Name="OrderId" />
    </Key>
    <Property Name="OrderId" Type="Int32" Nullable="false" />
    <Property Name="OrderDate" Type="Int32" Nullable="true" />
    <Property Name="Description" Type="String" Nullable="true" />
    <NavigationProperty Name="Customer" Relationship="Model1.CustomerOrder" FromRole="Order"
 ToRole="Customer" />
  </EntityType>
  <EntityType Name="SalesOrder" BaseType="Self.Order">
    <Property Name="Paid" Type="Boolean" Nullable="false" />
  </EntityType>
  <EntityType OpenType="true" Name="Product">
    <Key>
      <PropertyRef Name="ProductId" />
    </Key>
    <Property Name="ProductId" Type="Int32" Nullable="false" />
    <Property Name="Name" Type="String" Nullable="false" />
    <Property Name="Description" Type="String" Nullable="true" />
  </EntityType>
  <Association Name="CustomerOrder">
    <End Type="Model1.Customer" Role="Customer" Multiplicity="1" />
    <End Type="Model1.Order" Role="Order" Multiplicity="*" />
  </Association>
  <ComplexType Name="Address">
    <Property Name="Street" Type="String" Nullable="false" />
    <Property Name="City" Type="String" Nullable="false" />
    <Property Name="State" Type="String" Nullable="false" />
    <Property Name="Zip" Type="String" Nullable="false" />
    <Property Name="Position" Type="GeographyPoint" Nullable="false" SRID="4326" />
  </ComplexType>
</Schema>
```

3.2 ValueTerm and Edm.TypeTerm

The following example shows a **conceptual schema definition language (CSDL)** where the ValueTerm and an **entity** type that is derived from **Edm.TypeTerm** that is used in the previous example is defined.

```
<Schema xmlns="http://schemas.microsoft.com/ado/2009/11/edm"
        Namespace="Model1"
        Alias="Self">
  <ValueTerm Name="Title" Type="String" />
  <EntityType Name="Person" BaseType="Edm.TypeTerm">
    <Property Name="DisplayName" Type="String" Nullable="true" />
    <Property Name="Email" Type="String" Nullable="true" />
    <Property Name="AccountID" Type="Int32" Nullable="false" />
  </EntityType>
</Schema>
```

4   Security Considerations

None.

5   Appendix A: Full XML Schemas

For ease of implementation, full XML schemas are provided in the following sections.

Schema name	Prefix	Section
CSDL Schema 1.0	xs:	5.1
CSDL Schema 1.1	xs:	5.2
CSDL Schema 2.0	xs:	5.3
CSDL Schema 3.0	xs:	5.4

5.1   CSDL Schema 1.0

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema elementFormDefault="qualified" attributeFormDefault="unqualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:cg="http://schemas.microsoft.com/ado/2006/04/codegeneration"
xmlns:edm="http://schemas.microsoft.com/ado/2006/04/edm"
targetNamespace="http://schemas.microsoft.com/ado/2006/04/edm">
  <xs:annotation>
    <xs:documentation xml:lang="en">
            Common Data Model Schema Definition Language.
            Copyright (c) Microsoft Corp. All rights reserved.
        </xs:documentation>
  </xs:annotation>
  <xs:import namespace="http://schemas.microsoft.com/ado/2006/04/codegeneration"
schemaLocation="System.Data.Resources.CodeGenerationSchema.xsd" />
  <xs:element name="Schema" type="edm:TSchema" />
  <xs:complexType name="TSchema">
    <xs:sequence>
      <xs:group ref="edm:GSchemaBodyElements" minOccurs="0" maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
    <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="optional" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:group name="GSchemaBodyElements">
    <xs:choice>
      <xs:element name="Using" type="edm:TUsing" minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="Association" type="edm:TAssociation" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element name="ComplexType" type="edm:TComplexType" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element name="EntityType" type="edm:TEntityType" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element ref="edm:EntityContainer" minOccurs="1" maxOccurs="1" />
    </xs:choice>
  </xs:group>
  <!-- EDM SimpleType instances for use by EDM Instance documents-->
  <xs:simpleType name="EDMSimpleType">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Binary" />
      <xs:enumeration value="Boolean" />
      <xs:enumeration value="Byte" />
      <xs:enumeration value="DateTime" />
      <xs:enumeration value="DateTimeOffset" />
      <xs:enumeration value="Time" />
      <xs:enumeration value="Decimal" />
```

```xml
        <xs:enumeration value="Double" />
        <xs:enumeration value="Single" />
        <xs:enumeration value="Guid" />
        <xs:enumeration value="Int16" />
        <xs:enumeration value="Int32" />
        <xs:enumeration value="Int64" />
        <xs:enumeration value="String" />
        <xs:enumeration value="SByte" />
      </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TMax">
    <xs:restriction base="xs:string">
      <xs:enumeration value="Max" />
    </xs:restriction>
  </xs:simpleType>
  <!-- Facets for Primitive types -->
  <xs:simpleType name="TMaxLengthFacet">
    <xs:union memberTypes="edm:TMax xs:nonNegativeInteger  " />
  </xs:simpleType>
  <xs:simpleType name="TIsFixedLengthFacet">
    <xs:restriction base="xs:boolean" />
  </xs:simpleType>
  <xs:simpleType name="TPrecisionFacet">
    <xs:restriction base="xs:nonNegativeInteger" />
  </xs:simpleType>
  <xs:simpleType name="TScaleFacet">
    <xs:restriction base="xs:nonNegativeInteger" />
  </xs:simpleType>
  <xs:simpleType name="TIsUnicodeFacet">
    <xs:restriction base="xs:boolean" />
  </xs:simpleType>
  <xs:simpleType name="TCollationFacet">
    <xs:restriction base="xs:string" />
  </xs:simpleType>
  <!--
        types at all levels
      -->
  <xs:complexType name="TDocumentation">
    <xs:annotation>
      <xs:documentation>The Documentation element is used to provide documentation of
comments on the contents of the XML file.  It is valid under Schema, Type, Index and
Relationship elements.</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:element name="Summary" type="edm:TText" minOccurs="0" maxOccurs="1" />
      <xs:element name="LongDescription" type="edm:TText" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:anyAttribute processContents="lax" namespace="##other" />
  </xs:complexType>
  <xs:complexType name="TText" mixed="true">
    <xs:sequence>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:anyAttribute processContents="lax" namespace="##other" />
  </xs:complexType>
  <xs:complexType name="TXmlOrText" mixed="true">
    <xs:annotation>
      <xs:documentation>This type allows pretty much any content</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:any namespace="##any" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
    <xs:anyAttribute processContents="skip" namespace="##any" />
  </xs:complexType>
  <!--
        types of the top level elements
      -->
  <xs:complexType name="TUsing">
```

```
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
      <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="required" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TAssociation">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="End" type="edm:TAssociationEnd" minOccurs="2" maxOccurs="2" />
        <xs:element name="ReferentialConstraint" type="edm:TConstraint" minOccurs="0"
maxOccurs="1" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TComplexType">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Property" type="edm:TComplexTypeProperty" minOccurs="0"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attributeGroup ref="edm:TTypeAttributes" />
      <xs:attribute ref="cg:TypeAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TConstraint">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Principal" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
        <xs:element name="Dependent" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TReferentialConstraintRoleElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
      </xs:sequence>
      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="required" />
    </xs:complexType>
    <xs:complexType name="TNavigationProperty">
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Relationship" type="edm:TQualifiedName" use="required" />
      <xs:attribute name="ToRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="FromRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
      <xs:attribute ref="cg:SetterAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityType">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
```

```xml
      <xs:element name="Key" type="edm:TEntityKeyElement" minOccurs="0" maxOccurs="1" />
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="Property" type="edm:TEntityProperty" minOccurs="0"
maxOccurs="unbounded" />
        <xs:element name="NavigationProperty" type="edm:TNavigationProperty" minOccurs="0"
maxOccurs="unbounded" />
      </xs:choice>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attributeGroup ref="edm:TDerivableTypeAttributes" />
    <xs:attribute ref="cg:TypeAccess" use="optional" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TEntityKeyElement">
    <xs:sequence>
      <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TPropertyRef">
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  </xs:complexType>
  <xs:group name="GEmptyElementExtensibility">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
  </xs:group>
  <!--
      base types
    -->
  <xs:complexType name="TAssociationEnd">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:group ref="edm:TOperations" minOccurs="0" maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TQualifiedName" use="required" />
    <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
    <xs:attribute name="Multiplicity" type="edm:TMultiplicity" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:group name="TOperations">
    <xs:choice>
      <xs:element name="OnDelete" type="edm:TOnAction" maxOccurs="1" minOccurs="0" />
    </xs:choice>
  </xs:group>
  <xs:complexType name="TOnAction">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Action" type="edm:TAction" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TEntityProperty">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TComplexTypeProperty">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
```

```
          </xs:sequence>
      <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TFunctionImportParameter">
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attributeGroup ref="edm:TFunctionImportParameterAttributes" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:attributeGroup name="TCommonPropertyAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
      <xs:attribute name="Nullable" type="xs:boolean" default="true" use="optional" />
      <xs:attribute name="DefaultValue" type="xs:string" use="optional" />
      <!-- Start Facets -->
      <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
      <xs:attribute name="FixedLength" type="edm:TIsFixedLengthFacet" use="optional" />
      <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
      <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
      <xs:attribute name="Unicode" type="edm:TIsUnicodeFacet" use="optional" />
      <xs:attribute name="Collation" type="edm:TCollationFacet" use="optional" />
      <!--End Facets -->
      <xs:attribute name="ConcurrencyMode" type="edm:TConcurrencyMode" use="optional" />
      <xs:attribute ref="cg:SetterAccess" use="optional" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
    </xs:attributeGroup>
    <xs:attributeGroup name="TFunctionImportParameterAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
      <xs:attribute name="Mode" type="edm:TParameterMode" use="optional" />
      <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
      <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
      <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:attributeGroup>
    <xs:attributeGroup name="TFunctionImportAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="ReturnType" type="edm:TFunctionType" use="optional" />
      <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier" use="optional" />
      <xs:attribute ref="cg:MethodAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:attributeGroup>
    <xs:attributeGroup name="TTypeAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    </xs:attributeGroup>
    <xs:attributeGroup name="TDerivableTypeAttributes">
      <xs:attributeGroup ref="edm:TTypeAttributes" />
      <xs:attribute name="BaseType" type="edm:TQualifiedName" use="optional" />
      <xs:attribute name="Abstract" type="xs:boolean" use="optional" default="false" />
    </xs:attributeGroup>
    <xs:attributeGroup name="TEntitySetAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="EntityType" type="edm:TQualifiedName" use="required" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
    </xs:attributeGroup>
    <xs:element name="EntityContainer">
      <xs:complexType>
        <xs:sequence>
          <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
          <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:element name="FunctionImport">
              <xs:complexType>
                <xs:sequence>
                  <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
```

```xml
                <xs:element name="Parameter" type="edm:TFunctionImportParameter"
minOccurs="0" maxOccurs="unbounded" />
              </xs:sequence>
              <xs:attributeGroup ref="edm:TFunctionImportAttributes" />
            </xs:complexType>
          </xs:element>
          <xs:element name="EntitySet">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
              </xs:sequence>
              <xs:attributeGroup ref="edm:TEntitySetAttributes" />
              <xs:anyAttribute processContents="lax" namespace="##other" />
            </xs:complexType>
          </xs:element>
          <xs:element name="AssociationSet">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                <xs:element name="End" minOccurs="0" maxOccurs="2">
                  <!--
                    1. The number of Ends has to match with ones defined in
AssociationType
                    2. Value for attribute Name should match the defined ones and
EntitySet should be of the
                       defined Entity Type in AssociationType
                  -->
                  <xs:complexType>
                    <xs:sequence>
                      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0"
maxOccurs="1" />
                    </xs:sequence>
                    <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
                    <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier"
use="required" />
                  </xs:complexType>
                </xs:element>
                <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
              </xs:sequence>
              <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
              <xs:attribute name="Association" type="edm:TQualifiedName" use="required" />
              <xs:anyAttribute namespace="##other" processContents="lax" />
            </xs:complexType>
          </xs:element>
        </xs:choice>
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Extends" type ="edm:TSimpleIdentifier" use="optional" />
    </xs:complexType>
  </xs:element>
  <!--
    general  (more or less) purpose simple types
    -->
  <xs:simpleType name="TParameterMode">
    <xs:restriction base="xs:token">
      <xs:enumeration value="In" />
      <xs:enumeration value="Out" />
      <xs:enumeration value="InOut" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TNamespaceName">
    <xs:restriction base="edm:TQualifiedName">
      <xs:MaxLength value="512" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TQualifiedName">
```

```
    <xs:restriction base="xs:string">
      <!-- The below pattern represents the allowed identifiers in ECMA specification plus
the '.' for namespace qualification  -->
      <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TSimpleIdentifier">
    <xs:restriction base="xs:string">
      <xs:MaxLength value="480" />
      <!-- The below pattern represents the allowed identifiers in ECMA specification -->
      <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>
  <xs:simpleType name="TPropertyType">
    <xs:union memberTypes="edm:EDMSimpleType edm:TQualifiedName  ">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <!-- The below pattern represents the allowed identifiers in ECMA specification
plus the '.' for namespace qualification  -->
          <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TFunctionType">
    <xs:union memberTypes="edm:TQualifiedName    ">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:pattern value="Collection\([^ \t]{1,}(\.[^ \t]{1,}){0,}\)" />
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TAction">
    <xs:restriction base="xs:token">
      <xs:enumeration value="Cascade" />
      <xs:enumeration value="None" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TMultiplicity">
    <xs:restriction base="xs:token">
      <xs:enumeration value="0..1" />
      <xs:enumeration value="1" />
      <xs:enumeration value="*" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TConcurrencyMode">
    <xs:restriction base="xs:token">
      <xs:enumeration value="None" />
      <xs:enumeration value="Fixed" />
    </xs:restriction>
  </xs:simpleType>
</xs:schema>
```

5.2   CSDL Schema 1.1

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema elementFormDefault="qualified" attributeFormDefault="unqualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:cg="http://schemas.microsoft.com/ado/2006/04/codegeneration"
xmlns:edm="http://schemas.microsoft.com/ado/2007/05/edm"
targetNamespace="http://schemas.microsoft.com/ado/2007/05/edm">
```

```xml
        <xs:annotation>
          <xs:documentation xml:lang="en">
                  Common Data Model Schema Definition Language.
                  Copyright (c) Microsoft Corp. All rights reserved.
             </xs:documentation>
        </xs:annotation>
        <xs:import namespace="http://schemas.microsoft.com/ado/2006/04/codegeneration"
    schemaLocation="System.Data.Resources.CodeGenerationSchema.xsd" />
        <xs:element name="Schema" type="edm:TSchema" />
        <xs:complexType name="TSchema">
          <xs:sequence>
            <xs:group ref="edm:GSchemaBodyElements" minOccurs="0" maxOccurs="unbounded" />
            <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
    />
          </xs:sequence>
          <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
          <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="optional" />
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:complexType>
        <xs:group name="GSchemaBodyElements">
          <xs:choice>
            <xs:element name="Using" type="edm:TUsing" minOccurs="0" maxOccurs="unbounded" />
            <xs:element name="Association" type="edm:TAssociation" minOccurs="0"
    maxOccurs="unbounded" />
            <xs:element name="ComplexType" type="edm:TComplexType" minOccurs="0"
    maxOccurs="unbounded" />
            <xs:element name="EntityType" type="edm:TEntityType" minOccurs="0"
    maxOccurs="unbounded" />
            <xs:element ref="edm:EntityContainer" minOccurs="1" maxOccurs="1" />
          </xs:choice>
        </xs:group>
        <!-- EDM SimpleType instances for use by EDM Instance documents-->
        <xs:simpleType name="EDMSimpleType">
          <xs:restriction base="xs:string">
            <xs:enumeration value="Binary" />
            <xs:enumeration value="Boolean" />
            <xs:enumeration value="Byte" />
            <xs:enumeration value="DateTime" />
            <xs:enumeration value="DateTimeOffset" />
            <xs:enumeration value="Time" />
            <xs:enumeration value="Decimal" />
            <xs:enumeration value="Double" />
            <xs:enumeration value="Single" />
            <xs:enumeration value="Guid" />
            <xs:enumeration value="Int16" />
            <xs:enumeration value="Int32" />
            <xs:enumeration value="Int64" />
            <xs:enumeration value="String" />
            <xs:enumeration value="SByte" />
          </xs:restriction>
        </xs:simpleType>
        <xs:simpleType name="TMax">
          <xs:restriction base="xs:string">
            <xs:enumeration value="Max" />
          </xs:restriction>
        </xs:simpleType>
        <!-- Facets for Primitive types -->
        <xs:simpleType name="TMaxLengthFacet">
          <xs:union memberTypes="edm:TMax xs:nonNegativeInteger  " />
        </xs:simpleType>
        <xs:simpleType name="TIsFixedLengthFacet">
          <xs:restriction base="xs:boolean" />
        </xs:simpleType>
        <xs:simpleType name="TPrecisionFacet">
          <xs:restriction base="xs:nonNegativeInteger" />
        </xs:simpleType>
        <xs:simpleType name="TScaleFacet">
          <xs:restriction base="xs:nonNegativeInteger" />
        </xs:simpleType>
```

```xml
<xs:simpleType name="TIsUnicodeFacet">
  <xs:restriction base="xs:boolean" />
</xs:simpleType>
<xs:simpleType name="TCollationFacet">
  <xs:restriction base="xs:string" />
</xs:simpleType>
<!--
      types at all levels
    -->
<xs:complexType name="TDocumentation">
  <xs:annotation>
    <xs:documentation>The Documentation element is used to provide documentation of
comments on the contents of the XML file.  It is valid under Schema, Type, Index and
Relationship elements.</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:element name="Summary" type="edm:TText" minOccurs="0" maxOccurs="1" />
    <xs:element name="LongDescription" type="edm:TText" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:anyAttribute processContents="lax" namespace="##other" />
</xs:complexType>
<xs:complexType name="TText" mixed="true">
  <xs:sequence>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
  </xs:sequence>
  <xs:anyAttribute processContents="lax" namespace="##other" />
</xs:complexType>
<xs:complexType name="TXmlOrText" mixed="true">
  <xs:annotation>
    <xs:documentation>This type allows pretty much any content</xs:documentation>
  </xs:annotation>
  <xs:sequence>
    <xs:any namespace="##any" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:anyAttribute processContents="skip" namespace="##any" />
</xs:complexType>
<!--
      types of the top level elements
    -->
<xs:complexType name="TUsing">
  <xs:sequence>
    <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
  <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="required" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TAssociation">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:element name="End" type="edm:TAssociationEnd" minOccurs="2" maxOccurs="2" />
    <xs:element name="ReferentialConstraint" type="edm:TConstraint" minOccurs="0"
maxOccurs="1" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
  </xs:sequence>
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TComplexType">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:element name="Property" type="edm:TComplexTypeProperty" minOccurs="0"
maxOccurs="unbounded" />
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
```

```
      </xs:sequence>
      <xs:attributeGroup ref="edm:TDerivableTypeAttributes" />
      <xs:attribute ref="cg:TypeAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TConstraint">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Principal" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
        <xs:element name="Dependent" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TReferentialConstraintRoleElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
      </xs:sequence>
      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="required" />
    </xs:complexType>
    <xs:complexType name="TNavigationProperty">
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Relationship" type="edm:TQualifiedName" use="required" />
      <xs:attribute name="ToRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="FromRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
      <xs:attribute ref="cg:SetterAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityType">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Key" type="edm:TEntityKeyElement" minOccurs="0" maxOccurs="1" />
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="Property" type="edm:TEntityProperty" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="NavigationProperty" type="edm:TNavigationProperty" minOccurs="0"
maxOccurs="unbounded" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attributeGroup ref="edm:TDerivableTypeAttributes" />
      <xs:attribute ref="cg:TypeAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityKeyElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
      </xs:sequence>
    </xs:complexType>
    <xs:complexType name="TPropertyRef">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    </xs:complexType>
    <xs:group name="GEmptyElementExtensibility">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
```

```
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
  </xs:group>
  <!--
       base types
    -->
  <xs:complexType name="TAssociationEnd">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:group ref="edm:TOperations" minOccurs="0" maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TQualifiedName" use="required" />
    <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
    <xs:attribute name="Multiplicity" type="edm:TMultiplicity" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:group name="TOperations">
    <xs:choice>
      <xs:element name="OnDelete" type="edm:TOnAction" maxOccurs="1" minOccurs="0" />
    </xs:choice>
  </xs:group>
  <xs:complexType name="TOnAction">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Action" type="edm:TAction" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TEntityProperty">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TComplexTypeProperty">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TFunctionImportParameter">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TFunctionImportParameterAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:attributeGroup name="TCommonPropertyAttributes">
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
    <xs:attribute name="Nullable" type="xs:boolean" default="true" use="optional" />
    <xs:attribute name="DefaultValue" type="xs:string" use="optional" />
    <xs:attribute name="CollectionKind" type="edm:TPropertyCollectionKind" use="optional" />
    <!-- Start Facets -->
    <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
    <xs:attribute name="FixedLength" type="edm:TIsFixedLengthFacet" use="optional" />
    <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
    <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
    <xs:attribute name="Unicode" type="edm:TIsUnicodeFacet" use="optional" />
    <xs:attribute name="Collation" type="edm:TCollationFacet" use="optional" />
    <!--End Facets -->
    <xs:attribute name="ConcurrencyMode" type="edm:TConcurrencyMode" use="optional" />
    <xs:attribute ref="cg:SetterAccess" use="optional" />
```

```xml
        <xs:attribute ref="cg:GetterAccess" use="optional" />
      </xs:attributeGroup>
      <xs:attributeGroup name="TFunctionImportParameterAttributes">
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
        <xs:attribute name="Mode" type="edm:TParameterMode" use="optional" />
        <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
        <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
        <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:attributeGroup>
      <xs:attributeGroup name="TFunctionImportAttributes">
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="ReturnType" type="edm:TFunctionType" use="optional" />
        <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier" use="optional" />
        <xs:attribute ref="cg:MethodAccess" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:attributeGroup>
      <xs:attributeGroup name="TTypeAttributes">
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      </xs:attributeGroup>
      <xs:attributeGroup name="TDerivableTypeAttributes">
        <xs:attributeGroup ref="edm:TTypeAttributes" />
        <xs:attribute name="BaseType" type="edm:TQualifiedName" use="optional" />
        <xs:attribute name="Abstract" type="xs:boolean" use="optional" default="false" />
      </xs:attributeGroup>
      <xs:attributeGroup name="TEntitySetAttributes">
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="EntityType" type="edm:TQualifiedName" use="required" />
        <xs:attribute ref="cg:GetterAccess" use="optional" />
      </xs:attributeGroup>
      <xs:element name="EntityContainer">
        <xs:complexType>
          <xs:sequence>
            <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
            <xs:choice minOccurs="0" maxOccurs="unbounded">
              <xs:element name="FunctionImport">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                    <xs:element name="Parameter" type="edm:TFunctionImportParameter"
minOccurs="0" maxOccurs="unbounded" />
                  </xs:sequence>
                  <xs:attributeGroup ref="edm:TFunctionImportAttributes" />
                </xs:complexType>
              </xs:element>
              <xs:element name="EntitySet">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                  </xs:sequence>
                  <xs:attributeGroup ref="edm:TEntitySetAttributes" />
                  <xs:anyAttribute processContents="lax" namespace="##other" />
                </xs:complexType>
              </xs:element>
              <xs:element name="AssociationSet">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                    <xs:element name="End" minOccurs="0" maxOccurs="2">
                      <!--
                          1. The number of Ends has to match with ones defined in
AssociationType
                          2. Value for attribute Name should match the defined ones and
EntitySet should be of the
```

```xml
                                 defined Entity Type in AssociationType
                        -->
                    <xs:complexType>
                      <xs:sequence>
                        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0"
maxOccurs="1" />
                      </xs:sequence>
                      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
                      <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier"
use="required" />
                    </xs:complexType>
                  </xs:element>
                  <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
                </xs:sequence>
                <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
                <xs:attribute name="Association" type="edm:TQualifiedName" use="required" />
                <xs:anyAttribute namespace="##other" processContents="lax" />
            </xs:complexType>
          </xs:choice>
        </xs:sequence>
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="Extends" type ="edm:TSimpleIdentifier" use="optional" />
      </xs:complexType>
    </xs:element>
    <!--
      general  (more or less) purpose simple types
      -->
    <xs:simpleType name="TParameterMode">
      <xs:restriction base="xs:token">
        <xs:enumeration value="In" />
        <xs:enumeration value="Out" />
        <xs:enumeration value="InOut" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TPropertyCollectionKind">
      <xs:restriction base="xs:token">
        <xs:enumeration value="None" />
        <xs:enumeration value="List" />
        <xs:enumeration value="Bag" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TNamespaceName">
      <xs:restriction base="edm:TQualifiedName">
        <xs:MaxLength value="512" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TQualifiedName">
      <xs:restriction base="xs:string">
        <!-- The below pattern represents the allowed identifiers in ECMA specification plus
the '.' for namespace qualification  -->
        <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TSimpleIdentifier">
      <xs:restriction base="xs:string">
        <xs:MaxLength value="480" />
        <!-- The below pattern represents the allowed identifiers in ECMA specification -->
        <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>
    <xs:simpleType name="TPropertyType">
      <xs:union memberTypes="edm:EDMSimpleType edm:TQualifiedName  ">
        <xs:simpleType>
          <xs:restriction base="xs:token">
```

```
            <!-- The below pattern represents the allowed identifiers in ECMA specification
plus the '.' for namespace qualification  -->
            <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
          </xs:restriction>
        </xs:simpleType>
      </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TFunctionType">
    <xs:union memberTypes="edm:TQualifiedName    ">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:pattern value="Collection\([^ \t]{1,}(\.[^ \t]{1,}){0,}\)" />
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TAction">
    <xs:restriction base="xs:token">
      <xs:enumeration value="Cascade" />
      <xs:enumeration value="None" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TMultiplicity">
    <xs:restriction base="xs:token">
      <xs:enumeration value="0..1" />
      <xs:enumeration value="1" />
      <xs:enumeration value="*" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TConcurrencyMode">
    <xs:restriction base="xs:token">
      <xs:enumeration value="None" />
      <xs:enumeration value="Fixed" />
    </xs:restriction>
  </xs:simpleType>
</xs:schema>
```

5.3   CSDL Schema 2.0

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema elementFormDefault="qualified" attributeFormDefault="unqualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:cg="http://schemas.microsoft.com/ado/2006/04/codegeneration"
xmlns:edm="http://schemas.microsoft.com/ado/2008/09/edm"
targetNamespace="http://schemas.microsoft.com/ado/2008/09/edm">
  <xs:annotation>
    <xs:documentation xml:lang="en">
            Common Data Model Schema Definition Language.
            Copyright (c) Microsoft Corp. All rights reserved.
        </xs:documentation>
  </xs:annotation>
  <xs:import namespace="http://schemas.microsoft.com/ado/2006/04/codegeneration"
schemaLocation="System.Data.Resources.CodeGenerationSchema.xsd" />
  <xs:import namespace="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
schemaLocation="System.Data.Resources.AnnotationSchema.xsd" />
  <xs:element name="Schema" type="edm:TSchema" />
  <xs:complexType name="TSchema">
    <xs:sequence>
      <xs:group ref="edm:GSchemaBodyElements" minOccurs="0" maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
```

```xml
          <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="optional" />
          <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:complexType>
      <xs:group name="GSchemaBodyElements">
        <xs:choice>
          <xs:element name="Using" type="edm:TUsing" minOccurs="0" maxOccurs="unbounded" />
          <xs:element name="Association" type="edm:TAssociation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="ComplexType" type="edm:TComplexType" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="EntityType" type="edm:TEntityType" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="Function" type="edm:TFunction" minOccurs="0" maxOccurs="unbounded" />
          <xs:element ref="edm:EntityContainer" minOccurs="1" maxOccurs="1" />
        </xs:choice>
      </xs:group>
      <!-- EDM SimpleType instances for use by EDM Instance documents-->
      <xs:simpleType name="EDMSimpleType">
        <xs:restriction base="xs:string">
          <xs:enumeration value="Binary" />
          <xs:enumeration value="Boolean" />
          <xs:enumeration value="Byte" />
          <xs:enumeration value="DateTime" />
          <xs:enumeration value="DateTimeOffset" />
          <xs:enumeration value="Time" />
          <xs:enumeration value="Decimal" />
          <xs:enumeration value="Double" />
          <xs:enumeration value="Single" />
          <xs:enumeration value="Guid" />
          <xs:enumeration value="Int16" />
          <xs:enumeration value="Int32" />
          <xs:enumeration value="Int64" />
          <xs:enumeration value="String" />
          <xs:enumeration value="SByte" />
        </xs:restriction>
      </xs:simpleType>
      <xs:simpleType name="TMax">
        <xs:restriction base="xs:string">
          <xs:enumeration value="Max" />
        </xs:restriction>
      </xs:simpleType>
      <!-- Facets for Primitive types -->
      <xs:simpleType name="TMaxLengthFacet">
        <xs:union memberTypes="edm:TMax xs:nonNegativeInteger  " />
      </xs:simpleType>
      <xs:simpleType name="TIsFixedLengthFacet">
        <xs:restriction base="xs:boolean" />
      </xs:simpleType>
      <xs:simpleType name="TPrecisionFacet">
        <xs:restriction base="xs:nonNegativeInteger" />
      </xs:simpleType>
      <xs:simpleType name="TScaleFacet">
        <xs:restriction base="xs:nonNegativeInteger" />
      </xs:simpleType>
      <xs:simpleType name="TIsUnicodeFacet">
        <xs:restriction base="xs:boolean" />
      </xs:simpleType>
      <xs:simpleType name="TCollationFacet">
        <xs:restriction base="xs:string" />
      </xs:simpleType>
      <!--
           types at all levels
      -->
      <xs:complexType name="TDocumentation">
        <xs:annotation>
          <xs:documentation>The Documentation element is used to provide documentation of
comments on the contents of the XML file.  It is valid under Schema, Type, Index and
Relationship elements.</xs:documentation>
        </xs:annotation>
```

```xml
      <xs:sequence>
        <xs:element name="Summary" type="edm:TText" minOccurs="0" maxOccurs="1" />
        <xs:element name="LongDescription" type="edm:TText" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:anyAttribute processContents="lax" namespace="##other" />
  </xs:complexType>
  <xs:complexType name="TText" mixed="true">
    <xs:sequence>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:anyAttribute processContents="lax" namespace="##other" />
  </xs:complexType>
  <xs:complexType name="TXmlOrText" mixed="true">
    <xs:annotation>
      <xs:documentation>This type allows pretty much any content</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:any namespace="##any" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
    <xs:anyAttribute processContents="skip" namespace="##any" />
  </xs:complexType>
  <!--
      types of the top level elements
    -->
  <xs:complexType name="TUsing">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
    <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TAssociation">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:element name="End" type="edm:TAssociationEnd"  minOccurs="2" maxOccurs="2" />
      <xs:element name="ReferentialConstraint" type="edm:TConstraint" minOccurs="0"
maxOccurs="1" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TComplexType">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:element name="Property" type="edm:TComplexTypeProperty" minOccurs="0"
maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attributeGroup ref="edm:TTypeAttributes" />
    <xs:attribute ref="cg:TypeAccess" use="optional" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TConstraint">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:element name="Principal" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
      <xs:element name="Dependent" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
```

```xml
      </xs:sequence>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TReferentialConstraintRoleElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="required" />
    </xs:complexType>
    <xs:complexType name="TNavigationProperty">
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Relationship" type="edm:TQualifiedName" use="required" />
      <xs:attribute name="ToRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="FromRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
      <xs:attribute ref="cg:SetterAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityType">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Key" type="edm:TEntityKeyElement" minOccurs="0" maxOccurs="1" />
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="Property" type="edm:TEntityProperty" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="NavigationProperty" type="edm:TNavigationProperty" minOccurs="0"
maxOccurs="unbounded" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attributeGroup ref="edm:TDerivableTypeAttributes" />
      <xs:attribute ref="cg:TypeAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
```

```
<xs:complexType name="TFunction">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:choice minOccurs="0" maxOccurs="unbounded">
      <xs:element name="Parameter" type="edm:TFunctionParameter" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element name="DefiningExpression" type="edm:TCommandText" minOccurs="0"
maxOccurs="1" />
      <xs:element name="ReturnType" type="edm:TFunctionReturnType" minOccurs="0"
maxOccurs="1" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:choice>
  </xs:sequence>
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:attribute name="ReturnType" type="edm:TWrappedFunctionType" use="optional" />
  <xs:attributeGroup ref="edm:TFacetAttributes" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TFunctionParameter">
  <xs:sequence>
    <xs:choice minOccurs="0" maxOccurs="1">
      <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
      <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
      <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
    </xs:choice>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
  </xs:sequence>
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
  <xs:attributeGroup ref="edm:TFacetAttributes" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TCollectionType">
  <xs:sequence minOccurs ="1" maxOccurs="1">
    <xs:choice minOccurs="0" maxOccurs="1">
      <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
      <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
      <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
      <xs:element name="TypeRef" type="edm:TTypeRef" minOccurs="0" maxOccurs="1" />
    </xs:choice>
    <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
  </xs:sequence>
  <xs:attribute name="ElementType" type="edm:TUnwrappedFunctionType" use="optional" />
  <xs:attributeGroup ref="edm:TFacetAttributes" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TTypeRef">
  <xs:sequence>
    <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Type" type="edm:TUnwrappedFunctionType" use="required" />
  <xs:attributeGroup ref="edm:TFacetAttributes" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TReferenceType">
  <xs:sequence>
    <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Type" type="edm:TUnwrappedFunctionType" use="required" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
```

```
    <xs:complexType name="TRowType">
      <xs:choice minOccurs="1" maxOccurs="unbounded">
        <xs:element name="Property" type="edm:TProperty" minOccurs="0" maxOccurs="1" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:choice>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TProperty">
      <xs:sequence>
        <xs:choice minOccurs="0" maxOccurs="1">
          <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
      <xs:attributeGroup ref="edm:TFacetAttributes" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TFunctionReturnType">
      <xs:sequence>
        <xs:choice minOccurs="0" maxOccurs="1">
          <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
      <xs:attributeGroup ref="edm:TFacetAttributes" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>




    <xs:complexType name="TEntityKeyElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
```

```xml
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
  </xs:complexType>
  <xs:complexType name="TPropertyRef">
    <xs:sequence>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  </xs:complexType>
  <xs:group name="GEmptyElementExtensibility">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
  </xs:group>
  <!--
      base types
  -->
  <xs:complexType name="TAssociationEnd">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:group ref="edm:TOperations" minOccurs="0" maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TQualifiedName" use="required" />
    <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
    <xs:attribute name="Multiplicity" type="edm:TMultiplicity" use="optional" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:group name="TOperations">
    <xs:choice>
      <xs:element name="OnDelete" type="edm:TOnAction" maxOccurs="1" minOccurs="0" />
    </xs:choice>
  </xs:group>
  <xs:complexType name="TOnAction">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Action" type="edm:TAction" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TEntityProperty">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
    <xs:attribute ref="annotation:StoreGeneratedPattern" use="optional" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TComplexTypeProperty">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TFunctionImportParameter">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attributeGroup ref="edm:TFunctionImportParameterAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
```

```
<xs:attributeGroup name="TFacetAttributes">
  <xs:attribute name="Nullable" type="xs:boolean" use="optional" />
  <xs:attribute name="DefaultValue" type="xs:string" use="optional" />
  <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
  <xs:attribute name="FixedLength" type="edm:TIsFixedLengthFacet" use="optional" />
  <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
  <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
  <xs:attribute name="Unicode" type="edm:TIsUnicodeFacet" use="optional" />
  <xs:attribute name="Collation" type="edm:TCollationFacet" use="optional" />
</xs:attributeGroup>

<xs:attributeGroup name="TCommonPropertyAttributes">
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
  <xs:attribute name="Nullable" type="xs:boolean" default="true" use="optional" />
  <xs:attribute name="DefaultValue" type="xs:string" use="optional" />
  <!-- Start Facets -->
  <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
  <xs:attribute name="FixedLength" type="edm:TIsFixedLengthFacet" use="optional" />
  <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
  <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
  <xs:attribute name="Unicode" type="edm:TIsUnicodeFacet" use="optional" />
  <xs:attribute name="Collation" type="edm:TCollationFacet" use="optional" />
  <!--End Facets -->
  <xs:attribute name="ConcurrencyMode" type="edm:TConcurrencyMode" use="optional" />
  <xs:attribute ref="cg:SetterAccess" use="optional" />
  <xs:attribute ref="cg:GetterAccess" use="optional" />
</xs:attributeGroup>
<xs:attributeGroup name="TFunctionImportParameterAttributes">
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
  <xs:attribute name="Mode" type="edm:TParameterMode" use="optional" />
  <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
  <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
  <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:attributeGroup>
<xs:attributeGroup name="TFunctionImportAttributes">
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:attribute name="ReturnType" type="edm:TFunctionType" use="optional" />
  <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier" use="optional" />
  <xs:attribute ref="cg:MethodAccess" use="optional" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:attributeGroup>
<xs:attributeGroup name="TTypeAttributes">
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
</xs:attributeGroup>
<xs:attributeGroup name="TDerivableTypeAttributes">
  <xs:attributeGroup ref="edm:TTypeAttributes" />
  <xs:attribute name="BaseType" type="edm:TQualifiedName" use="optional" />
  <xs:attribute name="Abstract" type="xs:boolean" use="optional" default="false" />
</xs:attributeGroup>
<xs:attributeGroup name="TEntitySetAttributes">
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:attribute name="EntityType" type="edm:TQualifiedName" use="required" />
  <xs:attribute ref="cg:GetterAccess" use="optional" />
</xs:attributeGroup>
<xs:element name="EntityContainer">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="FunctionImport">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
```

```xml
                    <xs:element name="Parameter" type="edm:TFunctionImportParameter"
minOccurs="0" maxOccurs="unbounded" />
                    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
                  </xs:sequence>
                  <xs:attributeGroup ref="edm:TFunctionImportAttributes" />
                </xs:complexType>
              </xs:element>
              <xs:element name="EntitySet">
                <xs:complexType>
                  <xs:sequence>
                    <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
                  </xs:sequence>
                  <xs:attributeGroup ref="edm:TEntitySetAttributes" />
                  <xs:anyAttribute processContents="lax" namespace="##other" />
                </xs:complexType>
              </xs:element>
              <xs:element name="AssociationSet">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                    <xs:element name="End" minOccurs="0" maxOccurs="2">
                      <!--
                          1. The number of Ends has to match with ones defined in
AssociationType
                          2. Value for attribute Name should match the defined ones and
EntitySet should be of the
                             defined Entity Type in AssociationType
                      -->
                      <xs:complexType>
                        <xs:sequence>
                          <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0"
maxOccurs="1" />
                        </xs:sequence>
                        <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
                        <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier"
use="required" />
                      </xs:complexType>
                    </xs:element>
                    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
                  </xs:sequence>
                  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
                  <xs:attribute name="Association" type="edm:TQualifiedName" use="required" />
                  <xs:anyAttribute namespace="##other" processContents="lax" />
                </xs:complexType>
              </xs:element>
            </xs:choice>
            <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:sequence>
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="Extends" type ="edm:TSimpleIdentifier" use="optional" />
        <xs:attribute ref="cg:TypeAccess" use="optional" />
        <xs:attribute ref="annotation:LazyLoadingEnabled" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
  </xs:element>
  <!--
    general  (more or less) purpose simple types
    -->
  <xs:simpleType name="TParameterMode">
    <xs:restriction base="xs:token">
      <xs:enumeration value="In" />
      <xs:enumeration value="Out" />
      <xs:enumeration value="InOut" />
    </xs:restriction>
  </xs:simpleType>
```

```xml
<xs:simpleType name="TNamespaceName">
  <xs:restriction base="edm:TQualifiedName">
    <xs:MaxLength value="512" />
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TQualifiedName">
  <xs:restriction base="xs:string">
    <!-- The below pattern represents the allowed identifiers in ECMA specification plus
the '.' for namespace qualification  -->
    <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TSimpleIdentifier">
  <xs:restriction base="xs:string">
    <xs:MaxLength value="480" />
    <!-- The below pattern represents the allowed identifiers in ECMA specification -->
    <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>
<xs:simpleType name="TPropertyType">
  <xs:union memberTypes="edm:EDMSimpleType edm:TQualifiedName  ">
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <!-- The below pattern represents the allowed identifiers in ECMA specification
plus the '.' for namespace qualification  -->
        <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>
<xs:simpleType name="TCommandText">
  <xs:restriction base="xs:string">
    <xs:whiteSpace value="preserve" />
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TFunctionType">
  <xs:union memberTypes="edm:TQualifiedName     ">
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <xs:pattern value="Collection\([^ \t]{1,}(\.[^ \t]{1,}){0,}\)" />
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>
<xs:simpleType name="TWrappedFunctionType">
  <xs:union memberTypes="edm:TQualifiedName     ">
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <xs:pattern value="(Collection|Ref)\([^ \t]{1,}(\.[^ \t]{1,}){0,}\)" />
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>
<xs:simpleType name="TUnwrappedFunctionType">
  <xs:union memberTypes="edm:TQualifiedName     ">
    <xs:simpleType>
      <xs:restriction base="xs:token">
        <xs:pattern value="[^ \t]{1,}(\.[^ \t]{1,}){0,}" />
      </xs:restriction>
    </xs:simpleType>
  </xs:union>
</xs:simpleType>
<xs:simpleType name="TAction">
  <xs:restriction base="xs:token">
    <xs:enumeration value="Cascade" />
```

```
        <xs:enumeration value="None" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TMultiplicity">
      <xs:restriction base="xs:token">
        <xs:enumeration value="0..1" />
        <xs:enumeration value="1" />
        <xs:enumeration value="*" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TConcurrencyMode">
      <xs:restriction base="xs:token">
        <xs:enumeration value="None" />
        <xs:enumeration value="Fixed" />
      </xs:restriction>
    </xs:simpleType>
</xs:schema>
```

5.4   CSDL Schema 3.0

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema elementFormDefault="qualified" attributeFormDefault="unqualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:annotation="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
xmlns:cg="http://schemas.microsoft.com/ado/2006/04/codegeneration"
xmlns:edm="http://schemas.microsoft.com/ado/2009/11/edm"
targetNamespace="http://schemas.microsoft.com/ado/2009/11/edm">
  <xs:annotation>
    <xs:documentation xml:lang="en">
      Common Data Model Schema Definition Language.
      Copyright (c) Microsoft Corp. All rights reserved.
    </xs:documentation>
  </xs:annotation>
  <xs:import namespace="http://schemas.microsoft.com/ado/2006/04/codegeneration"
schemaLocation="System.Data.Resources.CodeGenerationSchema.xsd" />
  <xs:import namespace="http://schemas.microsoft.com/ado/2009/02/edm/annotation"
schemaLocation="System.Data.Resources.AnnotationSchema.xsd" />
  <xs:element name="Schema" type="edm:TSchema" />
  <xs:complexType name="TSchema">
    <xs:sequence>
      <xs:group ref="edm:GSchemaBodyElements" minOccurs="0" maxOccurs="unbounded" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Namespace" type="edm:TNamespaceName" use="optional" />
    <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="optional" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:group name="GSchemaBodyElements">
    <xs:choice>
      <xs:element name="Using" type="edm:TUsing" minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="Association" type="edm:TAssociation" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element name="ComplexType" type="edm:TComplexType" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element name="EntityType" type="edm:TEntityType" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element name="EnumType" type="edm:TEnumType" minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="ValueTerm" type="edm:TValueTerm" minOccurs="0" maxOccurs="unbounded"
/>
      <xs:element name="Function" type="edm:TFunction" minOccurs="0" maxOccurs="unbounded" />
      <xs:element name="Annotations" type="edm:TAnnotations" minOccurs="0"
maxOccurs="unbounded" />
      <xs:element ref="edm:EntityContainer" minOccurs="1" maxOccurs="1" />
    </xs:choice>
  </xs:group>
```

```xml
<!-- EDM SimpleType instances for use by EDM Instance documents-->
<xs:simpleType name="EDMSimpleType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Binary" />
    <xs:enumeration value="Boolean" />
    <xs:enumeration value="Byte" />
    <xs:enumeration value="DateTime" />
    <xs:enumeration value="DateTimeOffset" />
    <xs:enumeration value="Time" />
    <xs:enumeration value="Decimal" />
    <xs:enumeration value="Double" />
    <xs:enumeration value="Single" />
    <xs:enumeration value="Geography" />
    <xs:enumeration value="GeographyPoint" />
    <xs:enumeration value="GeographyLineString" />
    <xs:enumeration value="GeographyPolygon" />
    <xs:enumeration value="GeographyMultiPoint" />
    <xs:enumeration value="GeographyMultiLineString" />
    <xs:enumeration value="GeographyMultiPolygon" />
    <xs:enumeration value="GeographyCollection" />
    <xs:enumeration value="Geometry" />
    <xs:enumeration value="GeometryPoint" />
    <xs:enumeration value="GeometryLineString" />
    <xs:enumeration value="GeometryPolygon" />
    <xs:enumeration value="GeometryMultiPoint" />
    <xs:enumeration value="GeometryMultiLineString" />
    <xs:enumeration value="GeometryMultiPolygon" />
    <xs:enumeration value="GeometryCollection" />
    <xs:enumeration value="Guid" />
    <xs:enumeration value="Int16" />
    <xs:enumeration value="Int32" />
    <xs:enumeration value="Int64" />
    <xs:enumeration value="String" />
    <xs:enumeration value="SByte" />
    <xs:enumeration value="Stream" />
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TMax">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Max" />
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TVariable">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Variable" />
  </xs:restriction>
</xs:simpleType>
<!-- Facets for Primitive types -->
<xs:simpleType name="TMaxLengthFacet">
  <xs:union memberTypes="edm:TMax xs:nonNegativeInteger  " />
</xs:simpleType>
<xs:simpleType name="TIsFixedLengthFacet">
  <xs:restriction base="xs:boolean" />
</xs:simpleType>
<xs:simpleType name="TPrecisionFacet">
  <xs:restriction base="xs:nonNegativeInteger" />
</xs:simpleType>
<xs:simpleType name="TScaleFacet">
  <xs:restriction base="xs:nonNegativeInteger" />
</xs:simpleType>
<xs:simpleType name="TIsUnicodeFacet">
  <xs:restriction base="xs:boolean" />
</xs:simpleType>
<xs:simpleType name="TCollationFacet">
  <xs:restriction base="xs:string" />
</xs:simpleType>
<xs:simpleType name="TSridFacet">
  <xs:union memberTypes="edm:TVariable xs:nonNegativeInteger  " />
</xs:simpleType>
```

```xml
  <!--
      types at all levels
  -->
  <xs:complexType name="TDocumentation">
    <xs:annotation>
      <xs:documentation>The Documentation element is used to provide documentation of
comments on the contents of the XML file.  It is valid under Schema, Type, Index and
Relationship elements.</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:element name="Summary" type="edm:TText" minOccurs="0" maxOccurs="1" />
      <xs:element name="LongDescription" type="edm:TText" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:anyAttribute processContents="lax" namespace="##other" />
  </xs:complexType>
  <xs:complexType name="TText" mixed="true">
    <xs:sequence>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:anyAttribute processContents="lax" namespace="##other" />
  </xs:complexType>
  <xs:complexType name="TXmlOrText" mixed="true">
    <xs:annotation>
      <xs:documentation>This type allows pretty much any content</xs:documentation>
    </xs:annotation>
    <xs:sequence>
      <xs:any namespace="##any" processContents="skip" minOccurs="0" maxOccurs="unbounded" />
    </xs:sequence>
    <xs:anyAttribute processContents="skip" namespace="##any" />
  </xs:complexType>
  <!--
      types of the top level elements
  -->
  <xs:complexType name="TUsing">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Namespace" type="edm:TNamespaceName" use="required" />
    <xs:attribute name="Alias" type="edm:TSimpleIdentifier" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TAssociation">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:element name="End" type="edm:TAssociationEnd"  minOccurs="2" maxOccurs="2" />
      <xs:element name="ReferentialConstraint" type="edm:TConstraint" minOccurs="0"
maxOccurs="1" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TComplexType">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="Property" type="edm:TComplexTypeProperty" minOccurs="0"
maxOccurs="unbounded" />
        <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
        <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:choice>
```

```xml
        </xs:sequence>
      <xs:attributeGroup ref="edm:TTypeAttributes" />
      <xs:attribute ref="cg:TypeAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TConstraint">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Principal" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
        <xs:element name="Dependent" type="edm:TReferentialConstraintRoleElement" minOccurs="1"
maxOccurs="1" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TReferentialConstraintRoleElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="required" />
    </xs:complexType>
    <xs:complexType name="TNavigationProperty">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:choice>
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="Relationship" type="edm:TQualifiedName" use="required" />
      <xs:attribute name="ToRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="FromRole" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="ContainsTarget" type="xs:boolean" use="optional" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
      <xs:attribute ref="cg:SetterAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityType">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:element name="Key" type="edm:TEntityKeyElement" minOccurs="0" maxOccurs="1" />
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="Property" type="edm:TEntityProperty" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="NavigationProperty" type="edm:TNavigationProperty" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attributeGroup ref="edm:TDerivableTypeAttributes" />
      <xs:attribute name="OpenType" type="xs:boolean" use="optional" default="false" />
```

```
        <xs:attribute ref="cg:TypeAccess" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:complexType>
      <xs:complexType name="TEnumTypeMember">
        <xs:sequence>
          <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
        </xs:sequence>
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="Value" type="xs:long" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:complexType>
      <xs:complexType name="TEnumType">
        <xs:sequence>
          <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
          <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:element name="Member" type="edm:TEnumTypeMember" minOccurs="0"
maxOccurs="unbounded" />
            <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
            <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          </xs:choice>
          <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:sequence>
        <xs:attributeGroup ref="edm:TTypeAttributes" />
        <xs:attribute name="IsFlags" type="xs:boolean" use="optional" />
        <xs:attribute name="UnderlyingType" type="edm:TPropertyType" use="optional" />
        <xs:attribute ref="cg:TypeAccess" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:complexType>
      <xs:complexType name="TFunction">
        <xs:sequence>
          <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
          <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:element name="Parameter" type="edm:TFunctionParameter" minOccurs="0"
maxOccurs="unbounded" />
            <xs:element name="DefiningExpression" type="edm:TCommandText" minOccurs="0"
maxOccurs="1" />
            <xs:element name="ReturnType" type="edm:TFunctionReturnType" minOccurs="0"
maxOccurs="1" />
            <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
            <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
            <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
          </xs:choice>
        </xs:sequence>
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="ReturnType" type="edm:TWrappedFunctionType" use="optional" />
        <xs:attributeGroup ref="edm:TFacetAttributes" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
      </xs:complexType>
      <xs:complexType name="TFunctionParameter">
        <xs:sequence>
          <xs:choice minOccurs="0" maxOccurs="unbounded">
            <xs:choice minOccurs="0" maxOccurs="1">
              <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
              <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
              <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
            </xs:choice>
            <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
```

```
          <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
      </xs:choice>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TCollectionType">
    <xs:sequence minOccurs ="1" maxOccurs="1">
      <xs:choice minOccurs="0" maxOccurs="1">
        <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
        <xs:element name="TypeRef" type="edm:TTypeRef" minOccurs="0" maxOccurs="1" />
      </xs:choice>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="ElementType" type="edm:TUnwrappedFunctionType" use="optional" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TTypeRef">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TUnwrappedFunctionType" use="required" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TReferenceType">
    <xs:sequence>
      <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TUnwrappedFunctionType" use="required" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TRowType">
    <xs:choice minOccurs="1" maxOccurs="unbounded">
      <xs:element name="Property" type="edm:TRowProperty" minOccurs="0" maxOccurs="1" />
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:choice>
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TRowProperty">
    <xs:sequence>
      <xs:choice minOccurs="0" maxOccurs="1">
        <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
      </xs:choice>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TFunctionReturnType">
```

```
      <xs:sequence>
        <xs:choice minOccurs="0" maxOccurs="1">
          <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Type" type="edm:TFunctionImportParameterAndReturnType" use="optional"
/>
      <xs:attributeGroup ref="edm:TFacetAttributes" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TFunctionImportReturnType">
      <xs:sequence>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Type" type="edm:TFunctionImportParameterAndReturnType" use="optional"
/>
      <!-- EntitySet and EntitySetPath are mutually exclusive. -->
      <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier" use="optional" />
      <xs:attribute name="EntitySetPath" type="edm:TPath" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityKeyElement">
      <xs:sequence>
        <xs:element name="PropertyRef" type="edm:TPropertyRef" minOccurs="1"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
    </xs:complexType>
    <xs:complexType name="TPropertyRef">
      <xs:sequence>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    </xs:complexType>
    <xs:group name="GEmptyElementExtensibility">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
    </xs:group>

    <!--
         Vocabulary annotations.
    -->
    <xs:complexType name="TAnnotations">
      <xs:sequence>
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
        </xs:choice>
      </xs:sequence>
      <xs:attribute name="Target" type="edm:TPath" use="required" />
      <xs:attribute name="Qualifier" type="edm:TSimpleIdentifier" use="optional" />
    </xs:complexType>
    <xs:complexType name="TValueAnnotation">
      <xs:sequence>
```

```
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Term" type="edm:TQualifiedName" use="required" />
    <xs:attribute name="Qualifier" type="edm:TSimpleIdentifier" use="optional" />
    <xs:attributeGroup ref="edm:GInlineExpressions" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TTypeAnnotation">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="PropertyValue" type="edm:TPropertyValue" minOccurs="0"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="Term" type="edm:TQualifiedName" use="required" />
    <xs:attribute name="Qualifier" type="edm:TSimpleIdentifier" use="optional" />
    <xs:attributeGroup ref="edm:GInlineExpressions" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:group name="GExpression">
    <xs:sequence>
      <!-- Logically this group means one of the expressions plus an arbitrary number of CSDL
annotations,
           syntactically we have to make the inner sequence unbounded to allow elements in
any order. -->
      <xs:sequence maxOccurs="unbounded">
        <xs:choice>
          <xs:element name="String" type="edm:TStringConstantExpression" minOccurs="0" />
          <xs:element name="Binary" type="edm:TBinaryConstantExpression" minOccurs="0" />
          <xs:element name="Int" type="edm:TIntConstantExpression" minOccurs="0" />
          <xs:element name="Float" type="edm:TFloatConstantExpression" minOccurs="0" />
          <xs:element name="Guid" type="edm:TGuidConstantExpression" minOccurs="0" />
          <xs:element name="Decimal" type="edm:TDecimalConstantExpression" minOccurs="0" />
          <xs:element name="Bool" type="edm:TBoolConstantExpression" minOccurs="0" />
          <xs:element name="Time" type="edm:TTimeConstantExpression" minOccurs="0" />
          <xs:element name="DateTime" type="edm:TDateTimeConstantExpression" minOccurs="0" />
          <xs:element name="DateTimeOffset" type="edm:TDateTimeOffsetConstantExpression"
minOccurs="0" />
          <xs:element name="EnumMemberReference" type="edm:TEnumMemberReferenceExpression"
minOccurs="0" />
          <xs:element name="Null" type="edm:TNullExpression" minOccurs="0" />
          <xs:element name="Path" type="edm:TPathExpression" minOccurs="0" />
          <xs:element name="If" type="edm:TIfExpression" minOccurs="0" />
          <xs:element name="Record" type="edm:TRecordExpression" minOccurs="0" />
          <xs:element name="Collection" type="edm:TCollectionExpression" minOccurs="0" />
          <xs:element name="AssertType" type="edm:TAssertTypeExpression" minOccurs="0" />
          <xs:element name="IsType" type="edm:TIsTypeExpression" minOccurs="0" />
          <xs:element name="FunctionReference" type="edm:TFunctionReferenceExpression"
minOccurs="0" />
          <xs:element name="EntitySetReference" type="edm:TEntitySetReferenceExpression"
minOccurs="0" />
          <xs:element name="ParameterReference" type="edm:TParameterReferenceExpression"
minOccurs="0" />
          <xs:element name="Apply" type="edm:TApplyExpression" minOccurs="0" />
          <xs:element name="PropertyReference" type="edm:TPropertyReferenceExpression"
minOccurs="0" />
          <xs:element name="ValueTermReference" type="edm:TValueTermReferenceExpression"
minOccurs="0" />
          <xs:element name="LabeledElement" type="edm:TLabeledElement" minOccurs="0" />
          <xs:element name="LabeledElementReference"
type="edm:TLabeledElementReferenceExpression" minOccurs="0" />
        </xs:choice>
        <xs:any namespace="##other" processContents="lax" minOccurs="0" />
```

```
        </xs:sequence>
      </xs:sequence>
    </xs:group>
    <xs:attributeGroup name="GInlineExpressions">
      <xs:attribute name="String" type="xs:string" use="optional" />
      <xs:attribute name="Binary" type="xs:hexBinary" use="optional" />
      <xs:attribute name="Int" type="xs:integer" use="optional" />
      <xs:attribute name="Float" type="xs:double" use="optional" />
      <xs:attribute name="Guid" type="edm:TGuidLiteral" use="optional" />
      <xs:attribute name="Decimal" type="xs:decimal" use="optional" />
      <xs:attribute name="Bool" type="xs:boolean" use="optional" />
      <xs:attribute name="Time" type="xs:time" use="optional" />
      <xs:attribute name="DateTime" type="xs:dateTime" use="optional" />
      <xs:attribute name="DateTimeOffset" type="xs:dateTime" use="optional" />
      <xs:attribute name="Path" type="edm:TPath" use="optional" />
    </xs:attributeGroup>
    <xs:complexType name="TStringConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:string">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TBinaryConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:hexBinary">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TIntConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:integer">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TFloatConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:double">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TGuidConstantExpression">
      <xs:simpleContent>
        <xs:extension base="edm:TGuidLiteral">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:simpleType name="TGuidLiteral">
      <xs:restriction base="xs:string">
        <xs:pattern value="[0-9a-fA-F]{8}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{4}-[0-9a-fA-F]{12}"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:complexType name="TDecimalConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:decimal">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TBoolConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:boolean">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
```

```
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TTimeConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:time">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TDateTimeConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:dateTime">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TDateTimeOffsetConstantExpression">
      <xs:simpleContent>
        <xs:extension base="xs:dateTime">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TEnumMemberReferenceExpression">
      <xs:simpleContent>
        <xs:extension base="edm:TPath">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TNullExpression">
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TPathExpression">
      <xs:simpleContent>
        <xs:extension base="edm:TPath">
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>
    <xs:complexType name="TIfExpression">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <!-- Test, IfTrue, IfFalse -->
        <xs:group ref="edm:GExpression" minOccurs="3" maxOccurs="3" />
      </xs:sequence>
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TRecordExpression">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="PropertyValue" type="edm:TPropertyValue" minOccurs="0"
maxOccurs="unbounded" />
          <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:choice>
      </xs:sequence>
      <xs:attribute name="Type" type="edm:TUnwrappedFunctionType" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TPropertyValue">
      <xs:sequence>
```

```
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1" />
    </xs:sequence>
    <xs:attribute name="Property" type="edm:TSimpleIdentifier" use="required" />
    <xs:attributeGroup ref="edm:GInlineExpressions" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TCollectionExpression">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:group ref="edm:GExpression" minOccurs="0" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TAssertTypeExpression">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:choice maxOccurs="unbounded">
        <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1" />
        <xs:choice minOccurs="0" maxOccurs="1">
          <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
        </xs:choice>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TIsTypeExpression">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:choice maxOccurs="unbounded">
        <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1" />
        <xs:choice minOccurs="0" maxOccurs="1">
          <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
          <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
        </xs:choice>
      </xs:choice>
    </xs:sequence>
    <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TFunctionReferenceExpression">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:choice maxOccurs="unbounded">
        <!-- Parameter is used to complete function signature: type only. -->
        <xs:element name="Parameter" maxOccurs="unbounded">
          <xs:complexType>
            <xs:choice maxOccurs="unbounded">
              <xs:choice minOccurs="0" maxOccurs="1">
                <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
                <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
                <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
```

```
            </xs:choice>
            <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
          </xs:choice>
          <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:complexType>
      </xs:element>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:choice>
  </xs:sequence>
  <xs:attribute name="Function" type="edm:TQualifiedName" use="required" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TEntitySetReferenceExpression">
  <xs:simpleContent>
    <xs:extension base="edm:TPath">
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:complexType name="TParameterReferenceExpression">
  <xs:simpleContent>
    <xs:extension base="edm:TSimpleIdentifier">
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:extension>
  </xs:simpleContent>
</xs:complexType>
<xs:complexType name="TApplyExpression">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:group ref="edm:GExpression" minOccurs="0" maxOccurs="unbounded" />
  </xs:sequence>
  <xs:attribute name="Function" type="edm:TQualifiedName" use="optional" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TPropertyReferenceExpression">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
  <xs:attribute name="Property" type="edm:TSimpleIdentifier" use="required" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TValueTermReferenceExpression">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1"/>
  </xs:sequence>
  <xs:attribute name="Term" type="edm:TQualifiedName" use="required" />
  <xs:attribute name="Qualifier" type="edm:TSimpleIdentifier" use="optional" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TLabeledElement">
  <xs:sequence>
    <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
    <xs:group ref="edm:GExpression" minOccurs="1" maxOccurs="1" />
  </xs:sequence>
  <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  <xs:anyAttribute namespace="##other" processContents="lax" />
</xs:complexType>
<xs:complexType name="TLabeledElementReferenceExpression">
  <xs:simpleContent>
    <xs:extension base="edm:TSimpleIdentifier">
```

```xml
          <xs:anyAttribute namespace="##other" processContents="lax" />
        </xs:extension>
      </xs:simpleContent>
    </xs:complexType>

    <!--
         base types
      -->
    <xs:complexType name="TAssociationEnd">
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
        <xs:group ref="edm:TOperations" minOccurs="0" maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:sequence>
      <xs:attribute name="Type" type="edm:TQualifiedName" use="required" />
      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
      <xs:attribute name="Multiplicity" type="edm:TMultiplicity" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:group name="TOperations">
      <xs:choice>
        <xs:element name="OnDelete" type="edm:TOnAction" maxOccurs="1" minOccurs="0" />
      </xs:choice>
    </xs:group>
    <xs:complexType name="TOnAction">
      <xs:sequence>
        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0" maxOccurs="1" />
      </xs:sequence>
      <xs:attribute name="Action" type="edm:TAction" use="required" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TEntityProperty">
      <xs:sequence>
        <xs:choice maxOccurs="unbounded">
          <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:choice>
      </xs:sequence>
      <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
      <xs:attribute ref="annotation:StoreGeneratedPattern" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TComplexTypeProperty">
      <xs:sequence>
        <xs:choice maxOccurs="unbounded">
          <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
          <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
          <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:choice>
      </xs:sequence>
      <xs:attributeGroup ref="edm:TCommonPropertyAttributes" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
    <xs:complexType name="TValueTerm">
      <xs:sequence>
        <xs:choice minOccurs="0" maxOccurs="1">
```

```
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
        <xs:element name="CollectionType" type="edm:TCollectionType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="ReferenceType" type="edm:TReferenceType" minOccurs="0"
maxOccurs="1" />
        <xs:element name="RowType" type="edm:TRowType" minOccurs="0" maxOccurs="1" />
      </xs:choice>
      <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
    </xs:sequence>
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:attribute name="Type" type="edm:TWrappedFunctionType" use="optional" />
    <xs:attributeGroup ref="edm:TFacetAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>
  <xs:complexType name="TFunctionImportParameter">
    <xs:sequence>
      <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0" maxOccurs="1"
/>
      <xs:choice minOccurs="0" maxOccurs="unbounded">
        <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" minOccurs="0"
maxOccurs="unbounded" />
        <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" minOccurs="0"
maxOccurs="unbounded" />
        <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
      </xs:choice>
    </xs:sequence>
    <xs:attributeGroup ref="edm:TFunctionImportParameterAttributes" />
    <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:complexType>

  <xs:attributeGroup name="TFacetAttributes">
    <xs:attribute name="Nullable" type="xs:boolean" use="optional" />
    <xs:attribute name="DefaultValue" type="xs:string" use="optional" />
    <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
    <xs:attribute name="FixedLength" type="edm:TIsFixedLengthFacet" use="optional" />
    <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
    <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
    <xs:attribute name="Unicode" type="edm:TIsUnicodeFacet" use="optional" />
    <xs:attribute name="Collation" type="edm:TCollationFacet" use="optional" />
    <xs:attribute name="SRID" type="edm:TSridFacet" use="optional" />
  </xs:attributeGroup>

  <xs:attributeGroup name="TCommonPropertyAttributes">
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:attribute name="Type" type="edm:TPropertyType" use="required" />
    <xs:attribute name="Nullable" type="xs:boolean" default="true" use="optional" />
    <xs:attribute name="DefaultValue" type="xs:string" use="optional" />
    <!-- Start Facets -->
    <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
    <xs:attribute name="FixedLength" type="edm:TIsFixedLengthFacet" use="optional" />
    <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
    <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
    <xs:attribute name="Unicode" type="edm:TIsUnicodeFacet" use="optional" />
    <xs:attribute name="Collation" type="edm:TCollationFacet" use="optional" />
    <xs:attribute name="SRID" type="edm:TSridFacet" use="optional" />
    <!--End Facets -->
    <xs:attribute name="ConcurrencyMode" type="edm:TConcurrencyMode" use="optional" />
    <xs:attribute ref="cg:SetterAccess" use="optional" />
    <xs:attribute ref="cg:GetterAccess" use="optional" />
  </xs:attributeGroup>
  <xs:attributeGroup name="TFunctionImportParameterAttributes">
    <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
    <xs:attribute name="Type" type="edm:TFunctionImportParameterAndReturnType" use="required"
/>
    <xs:attribute name="Mode" type="edm:TParameterMode" use="optional" />
    <xs:attribute name="Nullable" type="xs:boolean" use="optional" />
```

```xml
          <xs:attribute name="MaxLength" type="edm:TMaxLengthFacet" use="optional" />
          <xs:attribute name="Precision" type="edm:TPrecisionFacet" use="optional" />
          <xs:attribute name="Scale" type="edm:TScaleFacet" use="optional" />
          <xs:attribute name="SRID" type="edm:TSridFacet" use="optional" />
          <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:attributeGroup>
  <xs:attributeGroup name="TFunctionImportAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="ReturnType" type="edm:TFunctionImportParameterAndReturnType"
use="optional" />
      <!-- EntitySet and EntitySetPath are mutually exclusive. -->
      <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier" use="optional" />
      <xs:attribute name="EntitySetPath" type="xs:string" use="optional" />
      <xs:attribute name="IsComposable" type="xs:boolean" use="optional" default="false" />
      <xs:attribute name="IsSideEffecting" type="xs:boolean" use="optional" />
      <xs:attribute name="IsBindable" type="xs:boolean" use="optional" default="false" />
      <xs:attribute ref="cg:MethodAccess" use="optional" />
      <xs:anyAttribute namespace="##other" processContents="lax" />
  </xs:attributeGroup>
  <xs:attributeGroup name="TTypeAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
  </xs:attributeGroup>
  <xs:attributeGroup name="TDerivableTypeAttributes">
      <xs:attributeGroup ref="edm:TTypeAttributes" />
      <xs:attribute name="BaseType" type="edm:TQualifiedName" use="optional" />
      <xs:attribute name="Abstract" type="xs:boolean" use="optional" default="false" />
  </xs:attributeGroup>
  <xs:attributeGroup name="TEntitySetAttributes">
      <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
      <xs:attribute name="EntityType" type="edm:TQualifiedName" use="required" />
      <xs:attribute ref="cg:GetterAccess" use="optional" />
  </xs:attributeGroup>
  <xs:element name="EntityContainer">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
        <xs:choice minOccurs="0" maxOccurs="unbounded">
          <xs:element name="FunctionImport">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                <xs:choice minOccurs="0" maxOccurs="unbounded">
                  <xs:element name="ReturnType" type="edm:TFunctionImportReturnType"
minOccurs="0" maxOccurs="unbounded" />
                  <xs:element name="Parameter" type="edm:TFunctionImportParameter"
minOccurs="0" maxOccurs="unbounded" />
                  <xs:element name="ValueAnnotation" type="edm:TValueAnnotation"
minOccurs="0" maxOccurs="unbounded" />
                  <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation"
minOccurs="0" maxOccurs="unbounded" />
                  <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
                </xs:choice>
              </xs:sequence>
              <xs:attributeGroup ref="edm:TFunctionImportAttributes" />
            </xs:complexType>
          </xs:element>
          <xs:element name="EntitySet">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                <xs:choice minOccurs="0" maxOccurs="unbounded">
                  <xs:element name="ValueAnnotation" type="edm:TValueAnnotation"
minOccurs="0" maxOccurs="unbounded" />
                  <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation"
minOccurs="0" maxOccurs="unbounded" />
```

```xml
                    <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
                  </xs:choice>
                </xs:sequence>
                <xs:attributeGroup ref="edm:TEntitySetAttributes" />
                <xs:anyAttribute processContents="lax" namespace="##other" />
              </xs:complexType>
            </xs:element>
            <xs:element name="AssociationSet">
              <xs:complexType>
                <xs:sequence>
                  <xs:element name="Documentation" type="edm:TDocumentation" minOccurs="0"
maxOccurs="1" />
                  <xs:element name="End" minOccurs="0" maxOccurs="2">
                    <!--
                        1. The number of Ends has to match with ones defined in
AssociationType
                        2. Value for attribute Name should match the defined ones and
EntitySet should be of the
                            defined Entity Type in AssociationType
                    -->
                    <xs:complexType>
                      <xs:sequence>
                        <xs:group ref="edm:GEmptyElementExtensibility" minOccurs="0"
maxOccurs="1" />
                      </xs:sequence>
                      <xs:attribute name="Role" type="edm:TSimpleIdentifier" use="optional" />
                      <xs:attribute name="EntitySet" type="edm:TSimpleIdentifier"
use="required" />
                    </xs:complexType>
                  </xs:element>
                  <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded" />
                </xs:sequence>
                <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
                <xs:attribute name="Association" type="edm:TQualifiedName" use="required" />
                <xs:anyAttribute namespace="##other" processContents="lax" />
              </xs:complexType>
            </xs:element>
            <xs:element name="ValueAnnotation" type="edm:TValueAnnotation" />
            <xs:element name="TypeAnnotation" type="edm:TTypeAnnotation" />
          </xs:choice>
          <xs:any namespace="##other" processContents="lax" minOccurs="0" maxOccurs="unbounded"
/>
        </xs:sequence>
        <xs:attribute name="Name" type="edm:TSimpleIdentifier" use="required" />
        <xs:attribute name="Extends" type ="edm:TSimpleIdentifier" use="optional" />
        <xs:attribute ref="cg:TypeAccess" use="optional" />
        <xs:attribute ref="annotation:LazyLoadingEnabled" use="optional" />
        <xs:anyAttribute namespace="##other" processContents="lax" />
    </xs:complexType>
  </xs:element>
  <!--
    general  (more or less) purpose simple types
    -->
  <xs:simpleType name="TParameterMode">
    <xs:restriction base="xs:token">
      <xs:enumeration value="In" />
      <xs:enumeration value="Out" />
      <xs:enumeration value="InOut" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TNamespaceName">
    <xs:restriction base="edm:TQualifiedName">
      <xs:MaxLength value="512" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TQualifiedName">
    <xs:restriction base="xs:string">
```

```xml
      <!-- The below pattern represents the allowed identifiers in ECMA specification plus
the '.' for namespace qualification  -->
      <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl}][\p{L}\p{N
l}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TPath">
    <xs:restriction base="xs:string">
      <!-- The below pattern represents the allowed identifiers in ECMA specification plus
the '/' for path segment separation and
         the '.' for namespace qualification inside the segments. It also allows using
parens and commas to designate function signatures
         such as "Namespace1.Namespace2.Function1(String,Collection(Int32))/Parameter1".-->
      <xs:pattern
value="[\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}\(\)\,]{0,}([/\.][\p{L}\p{Nl}][
\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}\(\)\,]{0,}){0,}" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TSimpleIdentifier">
    <xs:restriction base="xs:string">
      <xs:MaxLength value="480" />
      <!-- The below pattern represents the allowed identifiers in ECMA specification -->
      <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>
  <xs:simpleType name="TPropertyType">
    <xs:union memberTypes="edm:EDMSimpleType edm:TQualifiedName">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <!-- The below pattern represents the allowed identifiers in ECMA specification
plus the '.' for namespace qualification and Collection() wrapper  -->
          <xs:pattern
value="Collection\([\p{L}\p{Nl}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}(\.[\p{L}\p{Nl
}][\p{L}\p{Nl}\p{Nd}\p{Mn}\p{Mc}\p{Pc}\p{Cf}]{0,}){0,}\)" />
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TCommandText">
    <xs:restriction base="xs:string">
      <xs:whiteSpace value="preserve" />
    </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="TFunctionImportParameterAndReturnType">
    <xs:union memberTypes="edm:EDMSimpleType edm:TQualifiedName">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:pattern value="Collection\([^\. \t]{1,}(\.[^\. \t]{1,}){0,}\)" />
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TWrappedFunctionType">
    <xs:union memberTypes="edm:TQualifiedName">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:pattern value="(Collection|Ref)\([^\. \t]{1,}(\.[^\. \t]{1,}){0,}\)" />
        </xs:restriction>
      </xs:simpleType>
    </xs:union>
  </xs:simpleType>
  <xs:simpleType name="TUnwrappedFunctionType">
    <xs:union memberTypes="edm:TQualifiedName">
      <xs:simpleType>
        <xs:restriction base="xs:token">
          <xs:pattern value="[^\. \t]{1,}(\.[^\. \t]{1,}){0,}" />
        </xs:restriction>
      </xs:simpleType>
```

```
      </xs:union>
    </xs:simpleType>
    <xs:simpleType name="TAction">
      <xs:restriction base="xs:token">
        <xs:enumeration value="Cascade" />
        <xs:enumeration value="None" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TMultiplicity">
      <xs:restriction base="xs:token">
        <xs:enumeration value="0..1" />
        <xs:enumeration value="1" />
        <xs:enumeration value="*" />
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="TConcurrencyMode">
      <xs:restriction base="xs:token">
        <xs:enumeration value="None" />
        <xs:enumeration value="Fixed" />
      </xs:restriction>
    </xs:simpleType>
  </xs:schema>
```

6   Appendix B: Differences Between CSDL 1.0 and CSDL 1.1

CSDL 1.1 is a superset of CSDL 1.0.

This section summarizes the differences between CSDL 1.0 and CSDL 1.1.

CSDL 1.0 is restricted in the following ways:

- **ComplexType** cannot define an **Abstract** attribute.

- **ComplexType** cannot define a **BaseType** attribute.

- **ReturnType** for a **FunctionImport** can be a **collection**.

- **ReturnType** for a **FunctionImport** cannot be a collection of **ComplexType**.

- **Property** cannot define a **CollectionKind** attribute.

- **Property** of type **ComplexType** cannot be Nullable.

7   Appendix C: Differences Between CSDL 1.1 and CSDL 1.2

CSDL 1.2 is a superset of CSDL 1.1.

This section summarizes the differences between CSDL 1.1 and CSDL 1.2.

CSDL 1.1 is restricted in the following ways:

- **EntityType** cannot define an **OpenType** attribute.

8 Appendix D: Differences Between CSDL 1.2 and CSDL 2.0

CSDL 2.0 is a superset of CSDL 1.2.

This section summarizes the differences between CSDL 1.2 and CSDL 2.0.

CSDL 1.2 is restricted in the following ways:

- **ADO.NET Entity Framework** does not support CSDL 1.2.

- **Schema** cannot contain any **Function** child elements.

- Entity **Key** cannot define any **AnnotationElement** elements.

- In CSDL 1.0, CSDL 1.1, and CSDL 1.2, binary data type is not supported for defining **Key**.

- Entity **PropertyRef** cannot define any **AnnotationElement** elements.

- **ReferentialConstraint**, **Role** cannot define any **AnnotationElement** elements.

- **EntityContainer** cannot define any **AnnotationElement** elements.

- **FunctionImport** cannot define any **AnnotationElement** elements.

- **ReferentialConstraint** can only exist between the key properties of associated entities.

9   Appendix E: Differences Between CSDL 2.0 and CSDL 3.0

CSDL 3.0 is a superset of CSDL 2.0.

This section summarizes the differences between CSDL 2.0 and CSDL 3.0.

CSDL 2.0 is restricted in the following ways:

- **Property** cannot define a **Type** attribute with a value of "Collection".

- **Property** cannot use **EDMSimpleType** value of "Stream".

- **Property** cannot use the following **EDMSimpleType** values:

    - "Geography"

    - "GeographyPoint"

    - "GeographyLineString"

    - "GeographyPolygon"

    - "GeographyCollection"

    - "GeographyMultiPoint"

    - "GeographyMultiLineString"

    - "GeographyMultiPolygon"

    - "Geometry"

    - "GeometryPoint"

    - "GeometryLineString"

    - "GeometryPolygon"

    - "GeometryCollection"

    - "GeometryMultiPoint"

    - "GeometryMultiLineString"

    - "GeometryMultiPolygon"

- **FunctionImport** cannot define an **IsSideEffecting** attribute.

- **FunctionImport** cannot define an **IsComposable** attribute.

- **FunctionImport** cannot define an **IsBindable** attribute.

- **FunctionImport** cannot define a **ReturnType** as a child element.

- The following elements cannot appear:

    - **Annotations**

    - **Null**

    - **String**

- **Int**

- **Float**

- **Decimal**

- **Bool**

- **DateTime**

- **DateTimeOffset**

- **Guid**

- **Binary**

- **Record**

- **Collection**

- **LabeledElement**

- **Path**

- **Apply**

- **If**

- **IsType**

- **AssertType**

- **EnumType**

- **EnumType Member**

- **TypeAnnotation**

- **ValueAnnotation**

- **NavigationProperty** cannot have a **ContainsTarget** attribute.

10 Appendix F: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include updates to those products.

This document specifies version-specific details in the Microsoft .NET Framework. For information about which versions of .NET Framework are available in each released Windows product or as supplemental software, see [MS-NETOD] section 4.

▪ Microsoft .NET Framework 3.5

▪ Microsoft .NET Framework 4.0

▪ Microsoft .NET Framework 4.5

▪ Microsoft .NET Framework 4.6

▪ Microsoft .NET Framework 4.7

▪ Microsoft .NET Framework 4.8

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.

11 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Description	Revision class
10 Appendix F: Product Behavior	Added .NET Framework 4.8 to the list of applicable products.	Major

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Structures