

[MS-BDCMFFS]: Business Data Connectivity Model File Format

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Revision Summary

Date	Revision History	Revision Class	Comments
07/13/2009	0.1	Major	Initial Availability
08/28/2009	0.2	Editorial	Revised and edited the technical content
11/06/2009	0.3	Editorial	Revised and edited the technical content
02/19/2010	1.0	Major	Updated and revised the technical content
03/31/2010	1.01	Editorial	Revised and edited the technical content
04/30/2010	1.02	Editorial	Revised and edited the technical content
06/07/2010	1.03	Editorial	Revised and edited the technical content
06/29/2010	1.04	Editorial	Changed language and formatting in the technical content.
07/23/2010	1.05	Minor	Clarified the meaning of the technical content.
09/27/2010	1.05	No change	No changes to the meaning, language, or formatting of the technical content.
11/15/2010	1.05	No change	No changes to the meaning, language, or formatting of the technical content.
12/17/2010	1.05	No change	No changes to the meaning, language, or formatting of the technical content.
03/18/2011	1.05	No change	No changes to the meaning, language, or formatting of the technical content.
06/10/2011	1.05	No change	No changes to the meaning, language, or formatting of the technical content.

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1 Introduction

The Business Data Connectivity Model File Format Specification specifies two XML structures. The first, known as Metadata Model, is an XML structure used to describe the API of one or more **line-of-business (LOB) systems** and how that interface can be mapped to a well-defined interface of canonical operations. This structure is typically consumed by a runtime engine that translates canonical interface operation execution requests into the native LOB system's interface operation execution requests. The second XML structure, known as Metadata Model Resources, is used to describe permissions, localized names and additional information about utilizing the LOB system. The Metadata Model Resources structure is a subset of the Metadata Model structure.

1.1 Glossary

The following terms are defined in [\[MS-GLOS\]](#):

access control entry (ACE)
access control list (ACL)
Augmented Backus-Naur Form (ABNF)
Coordinated Universal Time (UTC)
domain account
domain name
GUID
language code identifier (LCID)
Unicode
XML

The following terms are defined in [\[MS-OFCGLOS\]](#):

AccessChecker
Action
ActionParameter
ActivityTrackingFilter
Association
AssociationGroup
AssociationNavigator
AssociationReference
Associator
BatchingPositionFilter
BatchingTerminationFilter
BinarySecurityDescriptorAccessor
BulkAssociatedIdEnumerator
BulkAssociationNavigator
BulkIdEnumerator
BulkSpecificFinder
Business Logic Module
ChangedIdEnumerator
claim value
ComparisonFilter
Creator
DefaultValue
DeletedIdEnumerator
Deleter
Disassociator
display name
endpoint

Entity
EntityInstance
field
filter
FilterDescriptor
Finder
GenericInvoker
Identifier
IdEnumerator
InputFilter
InputOutputFilter
LastIdFilter
LimitFilter
line-of-business (LOB) system
LobSystem
LobSystemInstance
locale
localized name
MetadataModel
MetadataObject
Method
MethodInstance
Model
OutputFilter
PageNumberFilter
Parameter
PasswordCredentialFilter
Property
ReturnTypeDescriptor
rights
root TypeDescriptor
Scalar
security principal
SpecificFinder
SsoTicketFilter
StreamAccessor
time zone
TimeStampFilter
TypeDescriptor
Uniform Resource Locator (URL)
Updater
UserContextFilter
UserCultureFilter
UsernameCredentialFilter
UserProfileFilter
View
Web service
WildcardFilter
XML namespace
XML namespace prefix
XML schema

The following terms are specific to this document:

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

1.2 References

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. Please check the archive site, <http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624>, as an additional source.

[ECMA-335] ECMA International, "Common Language Infrastructure (CLI) Partitions I to VI", ECMA-335, June 2006, <http://www.ecma-international.org/publications/standards/Ecma-335.htm>

[MS-NRTP] Microsoft Corporation, ".NET Remoting: Core Protocol Specification".

[MS-SPSTWS] Microsoft Corporation, "SharePoint Security Token Service Web Service Protocol Specification"

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

[RFC4648] Josefsson, S., "The Base16, Base32, and Base64 Data Encodings", RFC 4648, October 2006, <http://www.ietf.org/rfc/rfc4648.txt>

[RFC5234] Crocker, D., Ed., and Overell, P., "Augmented BNF for Syntax Specifications: ABNF", STD 68, RFC 5234, January 2008, <http://www.rfc-editor.org/rfc/rfc5234.txt>

[XMLNS] Bray, T., Hollander, D., Layman, A., et al., Eds., "Namespaces in XML 1.0 (Third Edition)", W3C Recommendation, December 2009, <http://www.w3.org/TR/2009/REC-xml-names-20091208/>

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

[XMLSCHEMA2] Biron, P.V., Ed. and Malhotra, A., Ed., "XML Schema Part 2: Datatypes", W3C Recommendation, May 2001, <http://www.w3.org/TR/2001/REC-xmlschema-2-20010502/>

1.2.2 Informative References

[CompositeFormatting] Microsoft Corporation, "Composite Formatting", .NET Framework Developer's Guide, <http://msdn.microsoft.com/en-us/library/txafckwd.aspx>

[MSDN-SharePointSDK] Microsoft Corporation, "SharePoint Products and Technologies SDK: 2010 API Reference (Technical Preview)", July 2009, [http://msdn.microsoft.com/en-us/library/ee557253\(office.14\).aspx](http://msdn.microsoft.com/en-us/library/ee557253(office.14).aspx)

[MS-GLOS] Microsoft Corporation, "Windows Protocols Master Glossary".

[MS-OFCGLOS] Microsoft Corporation, "Microsoft Office Master Glossary".

1.3 Structure Overview (Synopsis)

Enterprises have a variety of data stored in various line-of-business (LOB) systems. Typically, this data is accessible only through the proprietary programming interface of these software systems. It is desirable to be able to provide access to such data via a set of normalized interfaces so that users do not have to use system-specific or adapter-specific programming patterns for each system.

To facilitate this, it is possible to devise descriptions of the programmatic interface of the LOB systems using data structures such as **Methods**, **Parameters**, and **TypeDescriptors**, along with information about the LOB systems themselves (such as the server name, connection string and how to authenticate), using data structures such as **LobSystem** and **LobSystemInstance**. Methods can be considered to live within an **Entity** abstraction, representing a business data type, such as "customer" or "order". The LOB system interface definitions can then be transformed into normalized, stereotypical operations against Entities such as 'Read-An-Entity-Instance-By-Id', 'Read-Entity-Instances' and 'Check-Entity-Instance-Permissions' by annotating the actual LOB system interface descriptions, with the annotations described by data structures such as **MethodInstance**, **Identifier**, **FilterDescriptor**, and **Association**. These data structures, collectively called **MetadataObjects**, can be grouped into related collections called **MetadataModels** that describe LOB systems. Once a store of MetadataModels is made available, it can be utilized by a runtime engine to convert a stereotypical, normalized operation requested by an application reading this structure into a LOB system-specific invocation programmatically.

This document specifies Metadata Model, an **XML** structure that represents a serialized MetadataModel. Consumers of this structure are typically runtime engines that transform client requests in normalized, stereotypical form into actual LOB system interface calls. Producers of this structure are typically MetadataModel design tools.

This document also specifies Metadata Model Resources, an XML structure that represents permissions, localized names, and other non-structural information of a MetadataModel. The Metadata Model Resources structure is a subset of the Metadata Model structure. Consumers of this structure are typically metadata stores that merge the information in the structure to the corresponding MetadataModel already present in the metadata store. Producers of this structure are typically localization and access control tools.

1.4 Relationship to Protocols and Other Structures

The Business Data Connectivity Model File Format Specification is an XML Schema file as specified in [\[XMLSCHEMA1\]](#) and [\[XMLSCHEMA2\]](#).

1.5 Applicability Statement

There are typically two types of applications that can use the Business Data Connectivity Model File Format Specification, though an application that combines these functions in a single implementation is also feasible:

- MetadataModel designers, whose primary purpose is to create or edit a MetadataModel. These applications typically offer some graphical design surface and connectivity to LOB systems of known types to enable mining of the LOB system public interface definition and creation of corresponding MetadataModel.
- MetadataModel consumers, whose primary purpose is to read the MetadataModel file and use the information therein to convert uniform, stereotypical operations into LOB system-specific interface invocations.

This file format specification does not specify how the MetadataObjects can be used to do the conversion from a stereotypical client request into a system-specific invocation; it merely defines a serialized representation of MetadataObjects.

1.6 Versioning and Localization

This document covers versioning issues in the following areas:

Structure Versions: This structure specifies the only version of the Business Data Connectivity Model File Format Specification.

Localization: This structure specifies no locale-specific processes or data.

1.7 Vendor-Extensible Fields

The Business Data Connectivity Model File Format Specification defines vendor-extensible fields in the [Properties](#) element described in section [2.2.4.32](#).

2 Structures

The Metadata Model structure specifies an XML structure used to define a MetadataModel and all its MetadataObjects.

The Metadata Model Resources structure specifies an XML structure used to define **Properties**, **access control lists (ACLs)**, and **localized names** to be used with previously defined MetadataObjects.

2.1 Metadata Model

2.1.1 Namespaces

This specification defines and references various **XML namespaces** using the mechanisms specified in [\[XMLNS\]](#). Although this specification associates a specific **XML namespace prefix** for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

Prefix	Namespace URI	Reference
xs	http://www.w3.org/2001/XMLSchema	[XMLSCHEMA1] [XMLSCHEMA2]
bdc	http://schemas.microsoft.com/windows/2007/BusinessDataCatalog	

2.1.2 Global Elements

2.1.2.1 Model

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

A [Model](#) element that specifies a **Model**.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this element.

```
<xs:element name="Model" type="bdc:Model"/>
```

2.1.3 Global Attributes

None.

2.1.4 Complex Types

The definitions of some complex types in this section make use of **Augmented Backus-Naur Form (ABNF)** representation, as specified in [\[RFC5234\]](#).

2.1.4.1 Model

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Model](#)

A complex type that specifies a Model. Models refer to Entities. This complex type contains the [LobSystems](#) element that specifies the LobSystems containing the Entities the Model refers to.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Model.

Properties : A [Properties](#) element that specifies the Properties of the Model.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Model.

LobSystems : A LobSystems element that specifies the LobSystems that contain the Entities the Model refers to.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Model.

DefaultDisplayName : A NameString attribute that specifies the default **display name** of the Model.

IsCached : An xs:boolean attribute that specifies whether the Model is used frequently. This MAY [<1>](#) be used as a recommendation as to whether to cache the Model. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Model is infrequently used.
True	The Model is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Model">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="LobSystems" type="bdc:LobSystems" minOccurs="0" maxOccurs="1">
          <xs:unique name="LobSystemNameKey">
            <xs:selector xpath="*/">
              <xs:field xpath="@Name"/>
            </xs:unique>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
```

2.1.4.2 LobSystems

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Model](#)

A complex type that specifies a list of LobSystems of a Model.

Child Elements:

LobSystem : A [LobSystem](#) element that specifies a LobSystem.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LobSystems">
  <xs:sequence>
    <xs:element name="LobSystem" type="bdc:LobSystem" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.3 MetadataObject

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LobSystemInstance](#), [Identifier](#), [FilterDescriptor](#), [TypeDescriptor](#), [Parameter](#), [IndividuallySecurableMetadataObject](#), [AssociationGroup](#), [ActionParameter](#), [Action](#)

A complex type that specifies a MetadataObject.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the MetadataObject.

Properties : A [Properties](#) element that specifies the Properties of the MetadataObject.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the MetadataObject.

DefaultDisplayName : A NameString attribute that specifies the default display name of the MetadataObject.

IsCached : An xs:boolean attribute that specifies whether the MetadataObject is used frequently. This MAY [<2>](#) be used as a recommendation as to whether to cache the MetadataObject. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The MetadataObject is infrequently used.
True	The MetadataObject is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="MetadataObject" abstract="true">
  <xs:sequence>
    <xs:element name="LocalizedDisplayNames" type="bdc:LocalizedDisplayNames" minOccurs="0"
      maxOccurs="1">
      <xs:unique name="LocalizedDisplayNameLCIDKey">
```

```

        <xs:selector xpath="*" />
        <xs:field xpath="@LCID" />
      </xs:unique>
    </xs:element>
    <xs:element name="Properties" type="bdc:Properties" minOccurs="0" maxOccurs="1">
      <xs:unique name="PropertyNameKey">
        <xs:selector xpath="*" />
        <xs:field xpath="@Name" />
      </xs:unique>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="Name" type="bdc:NameString" use="required" />
  <xs:attribute name="DefaultDisplayName" type="bdc:NameString" />
  <xs:attribute name="IsCached" type="xs:boolean" default="true" />
</xs:complexType>

```

2.1.4.4 IndividuallySecurableMetadataObject

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [MethodInstance](#), [Method](#), [Entity](#), [LobSystem](#), [Model](#)

A complex type that specifies a MetadataObject that can be assigned a specific access control list (ACL).

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the MetadataObject.

Properties : A [Properties](#) element that specifies the Properties of the MetadataObject.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the MetadataObject.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the MetadataObject.

DefaultDisplayName : A NameString attribute that specifies the default display name of the MetadataObject.

IsCached : An xs:boolean attribute that specifies whether the MetadataObject is used frequently. This MAY [<3>](#) be used as a recommendation as to whether to cache the MetadataObject. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The MetadataObject is infrequently used.
True	The MetadataObject is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="IndividuallySecurableMetadataObject" abstract="true">

```

```

<xs:complexContent>
  <xs:extension base="bdc:MetadataObject">
    <xs:sequence>
      <xs:element name="AccessControlList" type="bdc:AccessControlList" minOccurs="0"
maxOccurs="1"/>
    </xs:sequence>
  </xs:extension>
</xs:complexContent>
</xs:complexType>

```

2.1.4.5 LocalizedDisplayNames

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Model](#), [LobSystem](#), [LobSystemInstance](#), [MetadataObject](#), [Entity](#), [Identifier](#), [Method](#), [FilterDescriptor](#), [Parameter](#), [TypeDescriptor](#), [Association](#), [MethodInstance](#), [IndividuallySecurableMetadataObject](#), [AssociationGroup](#), [Action](#), [ActionParameter](#)

A complex type that specifies a list of localized names of a MetadataObject.

Child Elements:

LocalizedDisplayName : A [LocalizedDisplayName](#) element that specifies a localized name.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="LocalizedDisplayNames">
  <xs:sequence>
    <xs:element name="LocalizedDisplayName" type="bdc:LocalizedDisplayName" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

2.1.4.6 LocalizedDisplayName

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LocalizedDisplayNames](#)

A complex type that specifies a localized name. The text associated with this element is the localized name associated with the specified **language code identifier (LCID)**.

Attributes:

LCID : An xs:integer attribute that specifies the language code identifier (LCID).

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="LocalizedDisplayName" mixed="true">
  <xs:attribute name="LCID" type="xs:integer" use="required"/>
</xs:complexType>

```

2.1.4.7 LobSystem

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LobSystems](#)

A complex type that specifies a LobSystem.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the LobSystem.

Properties : A [Properties](#) element that specifies the Properties of the LobSystem.

When the Type attribute of the LobSystem is "Wcf", the Properties MUST contain the Properties with names "WcfMexDocumentUrl" and "WcfProxyNameSpace", as specified by the following table:

Name	Type	Description
WcfMexDocumentUrl	System.String	The value of the property MUST be a Uniform Resource Locator (URL) . The URL MUST point to metadata that specifies how to generate one or more Business Logic Modules<4> that are associated with the LobSystem. The metadata format and generation algorithms are implementation-specific.
WcfProxyNameSpace<5>	System.String	The value MUST be the namespace of the data types defined in the Business Logic Module. The value MUST be in the format specified by the following ABNF specified by [RFC5234] : Namespace = Segment * (%x2E Segment) Segment = ALPHA * (ALPHA / DIGIT)

When the Type attribute of the LobSystem is "Custom", the Properties MUST contain a Property with name "SystemUtilityType" and type "System.String". The value of the Property MUST specify Business Logic Module<6> information for an implementation-specific extensibility mechanism utilized to connect to line-of-business (LOB) systems other than databases and web services. The value MUST be in the following format, expressed in ABNF as specified in [\[RFC5234\]](#):

```
Value = TypeName (%x2C FullAssemblyName)
FullAssemblyName = LibraryIdentifier %x2C VersionProperty %x2C CultureProperty %x2C
PublicKeyTokenProperty
```

LibraryIdentifier, VersionProperty, PublicKeyTokenProperty, and CultureProperty are as specified in [\[MS-NRTP\]](#) section 2.2.1.3.

TypeName: The name of the type<7> that conforms to the [\[ECMA-335\]](#) specification and can be understood by the .NET Framework. The format is as specified in [\[MS-NRTP\]](#) section 2.2.1.2.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the LobSystem.

Proxy : An xs:string element that specifies the Base 64 encoding representation specified in [\[RFC4648\]](#) of the information about Business Logic Modules<8> associated with the LobSystem containing this element. The information contained in this element MUST be in the format specified by the following ABNF, as specified by [\[RFC5234\]](#):


```

Information = HashLength Hash Modules
HashLength = HashLength1 HashLength2
HashLength1 = OCTET
HashLength2 = OCTET
Hash = WebServiceHash / WcfHash / DotNetHash/ CustomHash
WebServiceHash = *OCTET
WcfHash = *OCTET
DotNetHash = 4*4%x00
CustomHash = *OCTET
Modules = WebServiceModule / WcfModule/ DotNetModule / CustomModule
WebServiceModule = Assembly
WcfModule = Assembly
DotNetModule= 1*(Size Assembly)
Size = Size1 Size2 Size3 Size4
Size1 = OCTET
Size2 = OCTET
Size3 = OCTET
Size4 = OCTET
Assembly = *OCTET
CustomModule = *OCTET

```

HashLength1, HashLength2: represent the length of the Hash. The length of the Hash MUST be HashLength1 + 256*HashLength2.

Size1, Size2, Size3, Size4: represent the length of the Assembly. The length of the Assembly MUST be (((Size4 * 256) + Size3) * 256 + Size2)*256 + Size1.

Assembly: The bytes of a Business Logic Module[<9>](#9).

WebServiceHash: An implementation-specific identifier of the Business Logic Module[<10>](#10) represented by the webServiceModule. Hash MUST be WebServiceHash when the Type attribute of the LobSystem is "WebService".

WcfHash: An implementation-specific identifier of the Business Logic Module[<11>](#11) represented by the WcfModule. Hash MUST be WcfHash when the Type attribute of the LobSystem is "Wcf".

DotNetHash: Hash MUST be DotNetHashHash when the Type attribute of the LobSystem is "DotNetAssembly".

CustomHash: An implementation-specific identifier of the Business Logic Module[<12>](#12) represented by the CustomModule. Hash MUST be CustomHash when the Type attribute of the LobSystem is "Custom".

WebServiceModule: Modules MUST be WebServiceModule when the Type attribute of the LobSystem is "WebService"

WcfModule: Modules MUST be WcfModule when the Type attribute of the LobSystem is "Wcf"

DotNetModule: Modules MUST be DotNetModule when the Type attribute of the LobSystem is "DotNetAssembly"

CustomModule: An implementation-specific collection of Business Logic Modules<13>. Modules MUST be CustomModule when the Type attribute of the LobSystem is "Custom"

LobSystemInstances : A [LobSystemInstances](#) element that specifies a list of LobSystemInstances of the LobSystem.

Entities : An [Entities](#) element that specifies a list of Entities of the LobSystem.

Attributes:

Type : A [LobSystemType](#) attribute that specifies the type of the LobSystem.

Name : A [NameString](#) attribute that specifies the name of the LobSystem.

DefaultDisplayName : A NameString attribute that specifies the default display name of the LobSystem.

IsCached : An xs:boolean attribute that specifies whether the LobSystem is used frequently. This MAY<14> be used as a recommendation as to whether to cache the LobSystem. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The LobSystem is infrequently used.
True	The LobSystem is frequently used.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LobSystem">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="Proxy" type="xs:string" minOccurs="0" maxOccurs="1"/>
        <xs:element name="LobSystemInstances" type="bdc:LobSystemInstances" minOccurs="0"
maxOccurs="1">
          <xs:unique name="LobSystemInstanceNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Entities" type="bdc:Entities" minOccurs="0" maxOccurs="1">
          <xs:unique name="EntityNameNamespaceVersionKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
            <xs:field xpath="@Namespace"/>
            <xs:field xpath="@Version"/>
          </xs:unique>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

```

        </xs:sequence>
        <xs:attribute name="Type" type="bdc:LobSystemType" use="required"/>
    </xs:extension>
</xs:complexContent>
</xs:complexType>

```

2.1.4.8 LobSystemInstances

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LobSystem](#)

A complex type that specifies a list of LobSystemInstances of a LobSystem.

Child Elements:

LobSystemInstance : A [LobSystemInstance](#) element that specifies a LobSystemInstance.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="LobSystemInstances">
  <xs:sequence>
    <xs:element name="LobSystemInstance" type="bdc:LobSystemInstance" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

2.1.4.9 LobSystemInstance

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LobSystemInstances](#)

A complex type that specifies a LobSystemInstance of a LobSystem.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the LobSystemInstance.

Properties : A [Properties](#) element that specifies the Properties of the LobSystemInstance.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the LobSystemInstance.

DefaultDisplayName : A NameString attribute that specifies the default display name of the LobSystemInstance.

IsCached : An xs:boolean attribute that specifies whether the LobSystemInstance is used frequently. This MAY [<15>](#) be used as a recommendation as to whether to cache the LobSystemInstance. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The LobSystemInstance is infrequently used.
True	The LobSystemInstance is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LobSystemInstance">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.10 Entities

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LobSystem](#)

A complex type that specifies a list of Entities of a LobSystem.

Child Elements:

Entity : An [Entity](#) element that specifies an Entity.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Entities">
  <xs:sequence>
    <xs:element name="Entity" type="bdc:Entity" minOccurs="1" maxOccurs="unbounded">
      <xs:unique name="MethodInstanceNameKey">
        <xs:selector xpath="."//bdc:MethodInstances/*"/>
        <xs:field xpath="@Name"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

2.1.4.11 Entity

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entities](#)

A complex type that specifies an Entity.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Entity.

Properties : A [Properties](#) element that specifies the Properties of the Entity.

The Properties MAY contain a Property of type "System.String" with the Name attribute set to "Title". The value of the Property MUST be the path to a **field (4)** in a **View** of a MethodInstance as specified in section [2.1.5.5](#). In implementation-specific user interfaces, the value of the field is presented to identify an **EntityInstance**.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Entity.

Identifiers : An [Identifiers](#) element that specifies the Identifiers of the Entity.

Methods : A [Methods](#) element that specifies the Methods of the Entity.

AssociationGroups : An [AssociationGroups](#) element that specifies the **AssociationGroups** of the Entity.

Actions : An [Actions](#) element that specifies the **Actions** of the Entity.

Attributes:

Namespace : A [NameString](#) attribute that specifies the namespace of the Entity.

Version : A [VersionString](#) attribute that specifies the version number of the Entity.

EstimatedInstanceCount : An [InstanceCount](#) attribute that specifies the estimated number of EntityInstances contained by the line-of-business (LOB) system.

DefaultOperationMode : An [OperationModeType](#) attribute that specifies the default behavior when interacting with a line-of-business (LOB) system in an implementation-specific manner while creating, deleting, updating or reading EntityInstance data of the Entity.

Name : A NameString attribute that specifies the name of the Entity.

DefaultDisplayName : A NameString attribute that specifies the default display name of the Entity.

IsCached : An xs:boolean attribute that specifies whether the Entity is used frequently. This MAY [<16>](#) be used as a recommendation as to whether to cache the Entity. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Entity is infrequently used.
True	The Entity is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Entity">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="Identifiers" type="bdc:Identifiers" minOccurs="0">
          <xs:unique name="IdentifierNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name" />
          </xs:unique>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

```

<xs:element name="Methods" type="bdc:Methods" minOccurs="0">
  <xs:unique name="MethodNameKey">
    <xs:selector xpath="*/>
    <xs:field xpath="@Name"/>
  </xs:unique>
</xs:element>
<xs:element name="AssociationGroups" type="bdc:AssociationGroups" minOccurs="0">
  <xs:unique name="AssociationGroupNameKey">
    <xs:selector xpath="*/>
    <xs:field xpath="@Name"/>
  </xs:unique>
</xs:element>
<xs:element name="Actions" type="bdc:Actions" minOccurs="0">
  <xs:unique name="ActionNameKey">
    <xs:selector xpath="*/>
    <xs:field xpath="@Name"/>
  </xs:unique>
</xs:element>
</xs:sequence>
<xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
<xs:attribute name="Version" type="bdc:VersionString" use="required"/>
<xs:attribute name="EstimatedInstanceCount" type="bdc:InstanceCount" default="10000"/>
<xs:attribute name="DefaultOperationMode" type="bdc:OperationModeType"
default="Default" use="optional"/>
</xs:extension>
</xs:complexContent>
</xs:complexType>

```

2.1.4.12 AssociationGroups

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

A complex type that specifies a list of AssociationGroups of an Entity.

Child Elements:

AssociationGroup : An [AssociationGroup](#) element that specifies an AssociationGroup.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="AssociationGroups">
  <xs:sequence>
    <xs:element name="AssociationGroup" type="bdc:AssociationGroup" minOccurs="1"
maxOccurs="unbounded">
      <xs:unique name="AssociationReferenceAssociationNameEntityNameEntityNamespaceKey">
        <xs:selector xpath="*/>
        <xs:field xpath="@EntityNamespace"/>
        <xs:field xpath="@EntityName"/>
        <xs:field xpath="@AssociationName"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
</xs:complexType>

```

2.1.4.13 AssociationGroup

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [AssociationGroups](#)

A complex type that specifies an AssociationGroup.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the AssociationGroup.

Properties : A [Properties](#) element that specifies the Properties of the AssociationGroup.

AssociationReference : An [AssociationReference](#) element that specifies an **AssociationReference** of the AssociationGroup.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the AssociationGroup.

DefaultDisplayName : A NameString attribute that specifies the default display name of the AssociationGroup.

IsCached : An xs:boolean attribute that specifies whether the AssociationGroup is used frequently. This MAY [<17>](#) be used as a recommendation as to whether to cache the AssociationGroup. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The AssociationGroup is infrequently used.
True	The AssociationGroup is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="AssociationGroup">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="AssociationReference" type="bdc:AssociationReference" minOccurs="1"
maxOccurs="unbounded"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.14 AssociationReference

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [AssociationGroup](#)

A complex type that specifies an AssociationReference in an AssociationGroup. AssociationReferences refer to Associations.

Attributes:

EntityNamespace : A [NameString](#) attribute that specifies the namespace of the Entity where the referenced Association is defined.

EntityName : A [NameString](#) attribute that specifies the name of the Entity where the referenced Association is defined.

AssociationName : A [NameString](#) attribute that specifies the name of the referenced Association.

Reverse : An [xs:boolean](#) attribute that specifies whether the source of the referenced Association is the destination of the containing AssociationGroup and the destination of the referenced Association is the source of the containing AssociationGroup. This attribute **MUST** be set to one of the values listed in the following table.

Value	Description
False	The sources of the referenced Association are the sources of the containing AssociationGroup and the destination of the referenced Association is the destination of the containing AssociationGroup.
True	The source of the referenced Association is the destination of the containing AssociationGroup and destination of the referenced Association is the source of the containing AssociationGroup. The referenced Association MUST have only one source.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="AssociationReference">
  <xs:attribute name="EntityNamespace" type="bdc:NameString" use="optional"/>
  <xs:attribute name="EntityName" type="bdc:NameString" use="optional"/>
  <xs:attribute name="AssociationName" type="bdc:NameString" use="required"/>
  <xs:attribute name="Reverse" type="xs:boolean" use="optional" default="false"/>
</xs:complexType>
```

2.1.4.15 Identifiers

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

A complex type that specifies a list of Identifiers of an Entity.

Child Elements:

Identifier : An [Identifier](#) element that specifies an Identifier.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Identifiers">
  <xs:sequence>
    <xs:element name="Identifier" type="bdc:Identifier" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```


2.1.4.16 Identifier

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Identifiers](#)

A complex type that specifies an Identifier.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Identifier.

Properties : A [Properties](#) element that specifies the Properties of the Identifier.

Attributes:

TypeName : An [IdentifierType](#) attribute that specifies the data type of the value corresponding to the Identifier.

Name : A [NameString](#) attribute that specifies the name of the Identifier.

DefaultDisplayName : A [NameString](#) attribute that specifies the default display name of the Identifier.

IsCached : An xs:boolean attribute that specifies whether the Identifier is used frequently. This MAY [18](#) be used as a recommendation as to whether to cache the Identifier. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Identifier is infrequently used.
True	The Identifier is frequently used.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Identifier">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:attribute name="TypeName" type="bdc:IdentifierType" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.17 Methods

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

A complex type that specifies a list of Methods of an Entity.

Child Elements:

Method : A [Method](#) element that specifies a Method.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Methods">
  <xs:sequence>
    <xs:element name="Method" type="bdc:Method" minOccurs="1" maxOccurs="unbounded">
      <xs:key name="ParameterNameKey">
        <xs:selector xpath="//bdc:Parameter"/>
        <xs:field xpath="@Name"/>
      </xs:key>
      <xs:keyref name="ParameterNameRef" refer="bdc:ParameterNameKey">
        <xs:selector xpath="//bdc:MethodInstances/*"/>
        <xs:field xpath="@ReturnParameterName"/>
      </xs:keyref>
      <xs:key name="MethodMethodInstanceNameKey">
        <xs:selector xpath="//bdc:MethodInstances/*"/>
        <xs:field xpath="@Name"/>
      </xs:key>
      <xs:keyref name="DefaultValueMethodInstanceNameRef"
refer="bdc:MethodMethodInstanceNameKey">
        <xs:selector xpath="//bdc:DefaultValue"/>
        <xs:field xpath="@MethodInstanceName"/>
      </xs:keyref>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

2.1.4.18 Method

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Methods](#)

A complex type that specifies a Method.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Method.

Properties : A [Properties](#) element that specifies the Properties of the Method.

When the Type attribute of the LobSystem for the Entity containing this Method is set to "Database", the Properties MUST contain all of the Properties as specified in the following table.

Name	Type	Description
RdbCommandText	System.String	The value of this Property MUST be the implementation-specific command string to be executed on the database.
RdbCommandType	System.String	The value of this Property MUST be the implementation-specific type of the command string specified by the RdbCommandText property. <19>

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Method.

FilterDescriptors : A [FilterDescriptors](#) element that specifies the FilterDescriptors of the Method.

Parameters : A [Parameters](#) element that specifies the Parameters of the Method. A Method MUST NOT have more than one Parameter that has the value of the Direction attribute equal to "Return".

MethodInstances : A [MethodInstances](#) element that specifies the MethodInstances of the Method.

Attributes:

IsStatic : An xs:boolean attribute that specifies whether an implementation-specific execution of the Method requires an EntityInstance to serve as the context for execution<20>. The value MUST be in the following table:

Value	Description
False	The Method represents an instance Method and requires an EntityInstance to provide the context for execution.
True	The Method represents a static Method and does not require a specific EntityInstance to provide context for execution.

LobName : A [NameString](#) attribute that specifies the name of the operation defined in the line-of-business (LOB) system that is represented by this Method. For example, an operation in a line-of-business (LOB) system named "CN1A" can be represented by a Method with Name attribute equal to "GetCustomerByName". The LobName attribute of this Method can<21> be "CN1A".

Name : A NameString attribute that specifies the name of the Method.

DefaultDisplayName : A NameString attribute that specifies the default display name for the Method.

IsCached : An xs:boolean attribute that specifies whether the Method is used frequently. This MAY<22> be used as a recommendation as to whether to cache the Method. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Method is infrequently used.
True	The Method is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Method">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="FilterDescriptors" type="bdc:FilterDescriptors" minOccurs="0"
maxOccurs="1">
          <xs:unique name="FilterDescriptorNameKey">
            <xs:selector xpath="*/">
              <xs:field xpath="@Name"/>
            </xs:unique>
          </xs:element>
          <xs:element name="Parameters" type="bdc:Parameters" minOccurs="0" maxOccurs="1"/>
        </xs:sequence>
      </xs:extension>
    </complexContent>
  </complexType>
```

```

        <xs:element name="MethodInstances" type="bdc:MethodInstances" minOccurs="0"
maxOccurs="1"/>
    </xs:sequence>
    <xs:attribute name="IsStatic" type="xs:boolean" default="true"/>
    <xs:attribute name="LobName" type="bdc:NameString" use="optional"/>
</xs:extension>
</xs:complexContent>
</xs:complexType>

```

2.1.4.19 FilterDescriptors

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Method](#)

A complex type that specifies a list of FilterDescriptors of a Method.

Child Elements:

FilterDescriptor : A [FilterDescriptor](#) element that specifies a FilterDescriptor.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="FilterDescriptors">
  <xs:sequence>
    <xs:element name="FilterDescriptor" type="bdc:FilterDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

2.1.4.20 FilterDescriptor

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [FilterDescriptors](#)

A complex type that specifies a FilterDescriptor.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the FilterDescriptor.

Properties : A [Properties](#) element that specifies the Properties of the FilterDescriptor.

When the Type attribute of the FilterDescriptor is "Comparison", the Properties MAY contain a Property of type "System.String" with the Name attribute set to "Comparator". The value of the property MUST be set to the comparison operation implied by the FilterDescriptor. The value of the Property MUST be one of the following values: "Equals", "NotEqual", "GreaterThan", "GreaterOrEqual", "LessThan", "LessThanOrEqual", "=", "==", "!=", "<>", "<=", "<", ">=", or ">". If this Property is not present, the comparison operation implied by the FilterDescriptor MUST be "Equals".

Attributes:

Type : A [FilterDescriptorType](#) attribute that specifies the type of the FilterDescriptor.

FilterField : A [NameString](#) attribute that specifies the field (4) of an Entity to which the **Filter** is applied in an implementation-specific execution that uses the metadata.

Name : A [NameString](#) attribute that specifies the name of the FilterDescriptor.

DefaultDisplayName : A [NameString](#) attribute that specifies the default display name of the FilterDescriptor.

IsCached : An `xs:boolean` attribute that specifies whether the FilterDescriptor is used frequently. This MAY [<23>](#) be used as a recommendation as to whether to cache the FilterDescriptor. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The FilterDescriptor is infrequently used.
True	The FilterDescriptor is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="FilterDescriptor">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:attribute name="Type" type="bdc:FilterDescriptorType" use="required"/>
      <xs:attribute name="FilterField" type="bdc:NameString" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.21 MethodInstances

Target namespace: `http://schemas.microsoft.com/windows/2007/BusinessDataCatalog`

Referenced by: [Method](#)

A complex type that specifies a list of MethodInstances of a Method.

Child Elements:

Association : An [Association](#) element that specifies an Association.

MethodInstance : A [MethodInstance](#) element that specifies a MethodInstance.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="MethodInstances">
  <xs:choice minOccurs="1" maxOccurs="unbounded">
    <xs:element name="Association" type="bdc:Association">
      <xs:unique name="SourceEntityNameNamespaceKey">
        <xs:selector xpath="bdc:SourceEntity"/>
        <xs:field xpath="@Name"/>
        <xs:field xpath="@Namespace"/>
      </xs:unique>
    </xs:element>
  </xs:choice>
</xs:complexType>
```

```

        </xs:unique>
    </xs:element>
    <xs:element name="MethodInstance" type="bdc:MethodInstance"/>
</xs:choice>
</xs:complexType>

```

2.1.4.22 MethodInstance

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Association](#), [MethodInstances](#)

A complex type that specifies a MethodInstance.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the MethodInstance.

Properties : A [Properties](#) element that specifies the Properties of the MethodInstance.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the MethodInstance.

Attributes:

Type : A [MethodInstanceType](#) attribute that specifies the type of the MethodInstance.

Default : An xs:boolean attribute that specifies whether the MethodInstance is the default among all MethodInstances sharing its type within the containing Entity. This attribute MUST be set to one of the values listed in the following table:

Value	Description
False	The MethodInstance is not the default among all MethodInstances sharing its type within the containing Entity.
True	The MethodInstance is the default among all MethodInstances sharing its type within the containing Entity.

ReturnParameterName : A [NameString](#) attribute that specifies the name of the Parameter that contains the **ReturnTypeDescriptor** of the MethodInstance. The Direction attribute of the Parameter MUST have a value of either "Out", "InOut" or "Return".

This attribute MUST be specified for all types of MethodInstances except **GenericInvoker**, **Creator**, **Deleter** and **Updater**.

ReturnTypeDescriptorName : A NameString attribute that specifies the name of the ReturnTypeDescriptor of the MethodInstance. The Parameter specified by the ReturnParameterName attribute MUST contain the ReturnTypeDescriptor. This attribute MUST be ignored when ReturnTypeDescriptorPath attribute is specified. This attribute SHOULD NOT [<24>](#) be used.

When this attribute is missing, and the ReturnTypeDescriptorPath attribute is not specified, the application utilizing the structure MUST assume the name of the ReturnTypeDescriptor to be the name of the **root TypeDescriptor** of the Parameter specified by the ReturnParameterName attribute.

ReturnTypeDescriptorLevel : A [ReturnTypeDescriptorLevel](#) attribute that specifies the depth from the root of the ReturnTypeDescriptor of the MethodInstance, in the tree of nested TypeDescriptors where the root level equals 0. This attribute MUST be ignored. This attribute SHOULD NOT [<25>](#) be used.

ReturnTypeDescriptorPath : A [TypeDescriptorPathString](#) attribute that specifies the path [<26>](#) to the return value of the MethodInstance.

When this attribute is missing, and the ReturnTypeDescriptorName attribute is not specified, the application utilizing the structure MUST assume the name of the ReturnTypeDescriptor to be the name of the root TypeDescriptor of the Parameter specified by the ReturnParameterName attribute.

Name : A NameString attribute that specifies the name of the MethodInstance.

DefaultDisplayName : A NameString attribute that specifies the default display name for the MethodInstance.

IsCached : An xs:boolean attribute that specifies whether the MethodInstance is used frequently. This MAY [<27>](#) be used as a recommendation as to whether to cache the MethodInstance. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The MethodInstance is infrequently used.
True	The MethodInstance is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="MethodInstance">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:attribute name="Type" type="bdc:MethodInstanceType" use="required"/>
      <xs:attribute name="Default" type="xs:boolean" use="optional" default="false"/>
      <xs:attribute name="ReturnParameterName" type="bdc:NameString" use="optional"/>
      <xs:attribute name="ReturnTypeDescriptorName" type="bdc:NameString" use="optional"/>
      <xs:attribute name="ReturnTypeDescriptorLevel" type="bdc:ReturnTypeDescriptorLevel"
use="optional"/>
      <xs:attribute name="ReturnTypeDescriptorPath" type="bdc:TypeDescriptorPathString"
use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.23 Parameters

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Method](#)

A complex type that specifies a list of Parameters of a Method.

Child Elements:

Parameter : A [Parameter](#) element that specifies a Parameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Parameters">
  <xs:sequence>
    <xs:element name="Parameter" type="bdc:Parameter" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.24 Parameter

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Parameters](#)

A complex type that specifies a Parameter.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Parameter.

Properties : A [Properties](#) element that specifies the Properties of the Parameter.

TypeDescriptor : A [TypeDescriptor](#) element that specifies the root TypeDescriptor of the Parameter.

Attributes:

Direction : A [ParameterDirection](#) attribute that specifies the direction of the Parameter.

Name : A [NameString](#) attribute that specifies the name of the Parameter.

DefaultDisplayName : A NameString attribute that specifies the default display name of the Parameter.

IsCached : An xs:boolean attribute that specifies whether the Parameter is used frequently. This MAY<28> be used as a recommendation as to whether to cache the Parameter. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Parameter is infrequently used.
True	The Parameter is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Parameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor"/>
      </xs:sequence>
      <xs:attribute name="Direction" type="bdc:ParameterDirection" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```



```
</xs:extension>
</xs:complexContent>
</xs:complexType>
```

2.1.4.25 TypeDescriptor

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Parameter](#), [TypeDescriptors](#)

A complex type that specifies a TypeDescriptor.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the TypeDescriptor.

Properties : A [Properties](#) element that specifies the Properties of the TypeDescriptor.

When the TypeDescriptor is of type "System.String", the Properties MAY contain a Property of type "System.Int32" with the Name attribute set to "Size". The value of the Property specifies the expected maximum string length of the value of the data structure described by this TypeDescriptor.

Interpretation : An [Interpretation](#) element that specifies rules for the data stored by the data structure represented by the TypeDescriptor.

DefaultValues : A [DefaultValues](#) element that specifies the **DefaultValues** of the TypeDescriptor.

TypeDescriptors : A TypeDescriptors element that specifies the child TypeDescriptors of the TypeDescriptor.

Attributes:

TypeName : A [TypeDescriptorTypeNameString](#) attribute that specifies the implementation-specific identifier of the data type of the data structure that is represented by the TypeDescriptor.

LobName : A [NameString](#) attribute that specifies the name of the data structure that is represented by the TypeDescriptor. The default value of this attribute is the name of the TypeDescriptor. For example, a line-of-business (LOB) system data structure named "CN1A" can be represented by a TypeDescriptor with Name attribute equal to "Customer Name", if the LobName attribute of this TypeDescriptor is equal to "CN1A".

IdentifierEntityNamespace : A NameString attribute that specifies the namespace of the Entity that contains the Identifier that TypeDescriptor references. If the TypeDescriptor does not reference an Identifier, this attribute MUST NOT be present. When this attribute is present, the IdentifierEntityName and IdentifierName attributes MUST also be present. The default value of this attribute is the namespace of the Entity that contains the Method containing the Parameter that contains the TypeDescriptor.

IdentifierEntityName : A NameString attribute that specifies the name of the Entity that contains the Identifier that TypeDescriptor references. If the TypeDescriptor does not reference an Identifier, this attribute MUST NOT be present. When this attribute is present, the IdentifierEntityNamespace and IdentifierName attributes MUST also be present. The default value of this attribute is the name of the Entity that contains the Method containing the Parameter that contains the TypeDescriptor.

IdentifierName : A NameString attribute that specifies the name of the Identifier referenced by the TypeDescriptor. If the TypeDescriptor does not reference an Identifier, this attribute MUST NOT be present.

ForeignIdentifierAssociationName : A NameString attribute that specifies the name of the Association referenced by the TypeDescriptor. If the TypeDescriptor does not reference an Association, this attribute MUST NOT be present. When this attribute is present, the IdentifierName attribute MUST also be present. The ForeignIdentifierAssociationName attribute MUST be specified when the Identifier referenced by this TypeDescriptor is related to an Association, and the Identifier is contained by a source Entity of the Association.

ForeignIdentifierAssociationEntityName : A NameString attribute that specifies the name of the Entity that contains the Association referenced by the TypeDescriptor. If the TypeDescriptor does not reference an Association, this attribute MUST NOT be present. When this attribute is present, the ForeignIdentifierAssociationEntityNamespace and ForeignIdentifierAssociationName attributes MUST also be present. The default value of this attribute is the name of the Entity that contains the Method containing the Parameter that contains the TypeDescriptor.

ForeignIdentifierAssociationEntityNamespace : A NameString attribute that specifies the namespace of the Entity that contains the Association referenced by the TypeDescriptor. If the TypeDescriptor does not reference an Association, this attribute MUST NOT be present. When this attribute is present, the ForeignIdentifierAssociationEntityName and ForeignIdentifierAssociationName attributes MUST also be present. The default value of this attribute is the namespace of the Entity that contains the Method containing the Parameter that contains the TypeDescriptor.

AssociatedFilter : A NameString attribute that specifies the name of the FilterDescriptor that is associated with the TypeDescriptor. If the TypeDescriptor is not associated with a FilterDescriptor this attribute MUST NOT be present.

IsCollection : An xs:boolean attribute that specifies whether the TypeDescriptor represents a single data structure or a collection of data structures. The value MUST be as listed in the following table.

Value	Description
False	The TypeDescriptor represents a single data structure.
True	The TypeDescriptor represents a collection of data structures.

ReadOnly : An xs:boolean attribute that specifies whether the data stored by the data structure represented by the TypeDescriptor can be modified. This attribute MUST NOT be specified if the value of the Direction attribute of the Parameter that contains the TypeDescriptor is "In". The value MUST be as listed in the following table.

Value	Description
False	The data can be modified.
True	The data cannot be modified.

CreatorField : An xs:boolean attribute that specifies whether the TypeDescriptor represents a field (4) for MethodInstances of type Creator that are contained by the Method that contains the Parameter containing the TypeDescriptor. The value MUST be as listed in the following table.

Value	Description
False	The TypeDescriptor is not a field (4) in the Creator View.
True	The TypeDescriptor is a field (4) in the Creator View.

UpdaterField : An xs:boolean attribute that specifies whether the TypeDescriptor represents a field (4) for MethodInstances of type Updater that are contained by the Method that contains the Parameter containing the TypeDescriptor. When this attribute is specified, PreUpdaterField attribute MUST NOT be specified. The value MUST be as listed in the following table.

Value	Description
False	The TypeDescriptor is not a field (4) in the Updater View.
True	The TypeDescriptor is a field (4) in the Updater View.

PreUpdaterField : An xs:boolean attribute that specifies whether data structure represented by the TypeDescriptor stores the latest data value received from the line-of-business (LOB) system of a field (4) for MethodInstances of type Updater. When this attribute is specified, UpdaterField attribute MUST NOT be specified. The value MUST be as listed in the following table.

Value	Description
False	The TypeDescriptor does not store the last received value.
True	The TypeDescriptor stores the last received value.

Significant : An xs:boolean attribute that specifies whether values stored by the data structure represented by this TypeDescriptor is included in calculating a hash code or comparing values stored in the data structures. For example, a TypeDescriptor representing a customer's last name is taken into account when determining whether a record has been modified, thus it is significant, whereas the TypeDescriptor representing date on which the customer record is last read typically is not taken into account to determine whether a record has been modified, thus it is not significant. The value MUST be as listed in the following table.

Value	Description
False	The TypeDescriptor is not significant.
True	The TypeDescriptor is significant.

Name : A NameString attribute that specifies the name of the TypeDescriptor.

DefaultDisplayName : A NameString attribute that specifies the display name of the TypeDescriptor.

IsCached : An xs:boolean attribute that specifies whether the TypeDescriptor is used frequently. This MAY [<29>](#) be used as a recommendation as to whether to cache the TypeDescriptor. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The TypeDescriptor is infrequently used.

Value	Description
True	The TypeDescriptor is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="TypeDescriptor">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="Interpretation" type="bdc:Interpretation" minOccurs="0"/>
        <xs:element name="DefaultValues" type="bdc:DefaultValues" minOccurs="0">
          <xs:unique name="DefaultValueMethodInstanceNameKey">
            <xs:selector xpath="*/">
              <xs:field xpath="@MethodInstanceName"/>
            </xs:unique>
          </xs:element>
          <xs:element name="TypeDescriptors" type="bdc:TypeDescriptors" minOccurs="0">
            <xs:unique name="TypeDescriptorNameKey">
              <xs:selector xpath="*/">
                <xs:field xpath="@Name"/>
              </xs:unique>
            </xs:element>
          </xs:sequence>
          <xs:attribute name="TypeName" type="bdc:TypeDescriptorTypeNameString" use="required"/>
          <xs:attribute name="LobName" type="bdc:NameString" use="optional"/>
          <xs:attribute name="IdentifierEntityNamespace" type="bdc:NameString" use="optional"/>
          <xs:attribute name="IdentifierEntityName" type="bdc:NameString" use="optional"/>
          <xs:attribute name="IdentifierName" type="bdc:NameString" use="optional"/>
          <xs:attribute name="ForeignIdentifierAssociationName" type="bdc:NameString"
            use="optional"/>
          <xs:attribute name="ForeignIdentifierAssociationEntityName" type="bdc:NameString"
            use="optional"/>
          <xs:attribute name="ForeignIdentifierAssociationEntityNamespace" type="bdc:NameString"
            use="optional"/>
          <xs:attribute name="AssociatedFilter" type="bdc:NameString" use="optional"/>
          <xs:attribute name="IsCollection" type="xs:boolean" default="false" use="optional"/>
          <xs:attribute name="ReadOnly" type="xs:boolean" default="false" use="optional"/>
          <xs:attribute name="CreatorField" type="xs:boolean" default="false" use="optional"/>
          <xs:attribute name="UpdaterField" type="xs:boolean" default="false" use="optional"/>
          <xs:attribute name="PreUpdaterField" type="xs:boolean" default="false" use="optional"/>
          <xs:attribute name="Significant" type="xs:boolean" default="true" use="optional"/>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
```

2.1.4.26 DefaultValue

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [TypeDescriptor](#)

A complex type that specifies a list of DefaultValue of a TypeDescriptor.

Child Elements:

DefaultValue : A [DefaultValue](#) element that specifies the DefaultValue corresponding to a MethodInstance.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="DefaultValues">
  <xs:sequence>
    <xs:element name="DefaultValue" type="bdc:DefaultValue" minOccurs="1"
      maxOccurs="unbounded" nillable="true"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.27 DefaultValue

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [DefaultValues](#)

A complex type that specifies the DefaultValue of a TypeDescriptor for a MethodInstance. The text associated with this element is the DefaultValue of the containing TypeDescriptor for the specified MethodInstance.

The application that utilizes the structure MUST use this value during initialization of structures corresponding to the TypeDescriptor in the context of executing the referenced MethodInstance.

The [TypeDescriptor](#) containing a DefaultValue element MUST be contained by a [Parameter](#) whose Direction attribute is equal to "In" or "InOut".

Attributes:

MethodInstanceName : A [NameString](#) attribute that specifies the name of the MethodInstance this DefaultValue refers to.

Type : A [TypeDescriptorTypeNameString](#) attribute that specifies the data type of the DefaultValue.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="DefaultValue" mixed="true">
  <xs:attribute name="MethodInstanceName" type="bdc:NameString" use="required"/>
  <xs:attribute name="Type" type="bdc:TypeDescriptorTypeNameString" use="required"/>
</xs:complexType>
```

2.1.4.28 Interpretation

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [TypeDescriptor](#)

A complex type that specifies the rules to apply to the data stored in the data structures represented by a TypeDescriptor. These rules are specified to change the data values returned by the line-of-business (LOB) system to make it easier to represent them in the user interface when the metadata is being used. When the data value is obtained from the LOB system, the specified rules MUST be applied in the order they are specified in the Interpretation element. The first rule

MUST be applied to the data value received from the LOB system, the consecutive rules apply to the data value that results from the application of the previous rule. When the data value is sent to LOB system, the specified rules MUST be applied in the reverse order they are specified in the Interpretation element. The first rule MUST be applied to the data value received from the user, the consecutive rules apply to the data value that results from the application of the previous rule.

Child Elements:

ConvertType : A [ConvertType](#) element that specifies the conversion of a data type to another data type.

NormalizeDateTime : A [NormalizeDateTime](#) element that specifies the conversion of the date and time representation of a value obtained from a line-of-business (LOB) system into another representation.

NormalizeString : A [NormalizeString](#) element that specifies the conversion rules of the empty string or null value obtained from a line-of-business (LOB) system into another representation.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Interpretation">
  <xs:choice minOccurs="1" maxOccurs="unbounded">
    <xs:element name="ConvertType" type="bdc:ConvertType"/>
    <xs:element name="NormalizeDateTime" type="bdc:NormalizeDateTime"/>
    <xs:element name="NormalizeString" type="bdc:NormalizeString"/>
  </xs:choice>
</xs:complexType>
```

2.1.4.29 ConvertType

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Interpretation](#)

A complex type that specifies the rule to convert the data type of a data value into another data type. When the rules are applied in order, this rule specifies the data type of the data value to be converted to the data type specified by BDCType attribute. When the rules are applied in reverse order, this rule specifies the data type of the data value to be converted to the data type specified by LOBType attribute. For example, this rule can specify converting a date value obtained from a line-of-business (LOB) system, into a culture and locale sensitive string which will eventually be displayed to the user, and converting the updated value for that string back into the date compatible with the LOB system.

Attributes:

LOBType : A [TypeNameString](#) attribute that specifies the data type to convert the data value into when the rules are applied in reverse order.

BDCType : A [TypeNameString](#) attribute that specifies the data type to convert the data value into when the rules are applied in order.

LOBLocale : A [TypeNameString](#) attribute that specifies the **locale** that the data is expected to be formatted according to, when the rules are applied in order, and the locale that the data MUST be formatted according to, when the rules are applied in reverse order. The value of this attribute MUST be ignored when the data does not have a locale specific formatting. For example, if the data

is converted between an integer value and a string, value 1234 can be converted to "1234", "1.234" or "1,234" based on the specified locale. However, if the data is converted from an integer to a floating point number, the value is usually stored in an implementation-specific condensed form where a locale specific format is not applicable; therefore this attribute would be ignored.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="ConvertType">
  <xs:attribute name="LOBType" type="bdc:TypeNameString" use="required"/>
  <xs:attribute name="BDCType" type="bdc:TypeNameString" use="required"/>
  <xs:attribute name="LOBLocale" type="bdc:TypeNameString" use="optional"/>
</xs:complexType>
```

2.1.4.30 NormalizeString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Interpretation](#)

A complex type that specifies the rule to convert the representation of an empty string or null value to another representation. For example, this rule can specify converting a null value obtained from a line-of-business (LOB) system, into an empty string, which will eventually be displayed to the user.

Attributes:

FromLOB : A [StringNormalizeMode](#) attribute that specifies the representation of null value or empty string to convert the data value into when the rules are applied in order.

ToLOB : A [StringNormalizeMode](#) attribute that specifies the representation of null value or empty string to convert the data value into when the rules are applied in reverse order.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="NormalizeString">
  <xs:attribute name="FromLOB" type="bdc:StringNormalizeMode" use="required"/>
  <xs:attribute name="ToLOB" type="bdc:StringNormalizeMode" use="required"/>
</xs:complexType>
```

2.1.4.31 NormalizeDateTime

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Interpretation](#)

A complex type that specifies the rule to convert the representation of a date and time value to another representation. For example, this rule can specify converting a value represented in **Coordinated Universal Time (UTC)** into a local **time zone**.

Attributes:

LobDateTimeMode : A [LobDateTimeMode](#) attribute that specifies the conversion to apply.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="NormalizeDateTime">
  <xs:attribute name="LobDateTimeMode" type="bdc:LobDateTimeMode" use="required"/>
</xs:complexType>
```

2.1.4.32 TypeDescriptors

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [TypeDescriptor](#)

A complex type that specifies a list of TypeDescriptors of a TypeDescriptor. If the containing TypeDescriptor has IsCollection attribute set to true, the TypeDescriptors element MUST have exactly one TypeDescriptor element.

Child Elements:

TypeDescriptor : A TypeDescriptor element that specifies a TypeDescriptor.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="TypeDescriptors">
  <xs:sequence>
    <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.33 Actions

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

A complex type that specifies a list of Actions of an Entity.

Child Elements:

Action : An [Action](#) element that specifies an Action.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Actions">
  <xs:sequence>
    <xs:element name="Action" type="bdc:Action" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```


2.1.4.34 Action

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Actions](#)

A complex type that specifies an Action of an Entity.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Action.

Properties : A [Properties](#) element that specifies the Properties of the Action.

ActionParameters : An [ActionParameters](#) element that specifies the Parameters of the Action.

Attributes:

Position : An [ActionPosition](#) attribute that specifies the suggested position of this Action among the other Actions of this Entity. An application reading the structure can use this ordering as guidance in an implementation-specific algorithm that represents the Actions in the user interface.

IsOpenedInNewWindow : An xs:boolean attribute that specifies whether the results of executing an Action are presented in a new user interface context. An application reading the structure can use this value as guidance on creating new user interface context when the Action is executed.

Value	Description
False	Open in the same user interface context.
True	Open in a new user interface context.

Url : An [UrlString](#) attribute that specifies an abstract command that is interpreted by an application reading this structure. The interpretation is implementation-specific^{<30>}. The attribute comprises of text and placeholders. The application instantiates the abstract command by replacing the placeholders with values associated with the Action's **ActionParameters** in an implementation-specific manner^{<31>}.

The value of this attribute MUST be in the following format as expressed in ABNF as specified in [\[RFC5234\]](#):

```
Url = 1*( Text / EscapedLeftBracket / EscapedRightBracket / Placeholder )
Text = %x21-7A / %x7C / %x7E
EscapedLeftBracket = %x7B %x7B
EscapedRightBracket = %x7D %x7D
Placeholder = %x7B Index [%x2C Alignment] [%x3A Format] %x7D
Index = 1*DIGIT
Alignment = [%x2D] 1*DIGIT
Format = 1*ALPHA
```

The Text rule is used to produce any visible character other than a curly bracket.

When instantiating the command the EscapedLeftBracket and EscapedRightBracket rules MUST be changed to the following definitions:

```
EscapedLeftBracket = %x7B
```

EscapedRightBracket = %x7D

The Placeholder rule corresponds to a string segment that MUST be replaced with an implementation-specific value of an ActionParameter of the Action. The ActionParameter that MUST be used is identified by having the Index attribute equal to the integer value specified by the Index rule.

The Index rule corresponds to a string segment that represents an integer in base ten. The value of this integer MUST be identical to the value of Index attribute of exactly one ActionParameter of the Action.

The Alignment and Format rules correspond to string segments that are implementation-specific<32>.

ImageUrl : An UriString attribute that specifies the URL (Uniform Resource Locator) to the Action's icon image<33>.

Name : A [NameString](#) attribute that specifies the name of the Action.

DefaultDisplayName : A NameString attribute that specifies the default display name for the Action.

IsCached : An xs:boolean attribute that specifies whether the Action is used frequently. This MAY<34> be used as a recommendation as to whether to cache the Action. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Action is infrequently used.
True	The Action is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Action">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="ActionParameters" type="bdc:ActionParameters" minOccurs="0">
          <xs:unique name="ActionParameterNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name" />
          </xs:unique>
          <xs:unique name="ActionParameterIndexKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Index" />
          </xs:unique>
        </xs:element>
      </xs:sequence>
      <xs:attribute name="Position" type="bdc:ActionPosition" use="required" />
      <xs:attribute name="IsOpenedInNewWindow" type="xs:boolean" default="false" />
      <xs:attribute name="Url" type="bdc:UriString" use="required" />
      <xs:attribute name="ImageUrl" type="bdc:UriString" />
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.35 ActionParameters

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Action](#)

A complex type that specifies a list of ActionParameters of an Action.

Child Elements:

ActionParameter : An [ActionParameter](#) element that specifies an ActionParameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="ActionParameters">
  <xs:sequence>
    <xs:element name="ActionParameter" type="bdc:ActionParameter" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.36 ActionParameter

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [ActionParameters](#)

A complex type that specifies an ActionParameter of an Action.

The application that utilizes this structure MUST use ActionParameters to instantiate the abstract command specified by the Action's Url attribute.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the ActionParameter.

Properties : A [Properties](#) element that specifies the Properties of the ActionParameter.

The Properties MAY contain a Property of type "System.Int32" with the Name attribute set to "IdOrdinal". When specified, the ActionParameter represents an Identifier, when not specified the ActionParameter represents a field (4). The value of the Property specifies the index of the Identifier.

Attributes:

Index : An [Ordinal](#) attribute that specifies the position of this ActionParameter among the other ActionParameters in the Action that contains the ActionParameter.

Name : A [NameString](#) attribute that specifies the name of the ActionParameter.

DefaultDisplayName : A NameString attribute that specifies the default display name for the ActionParameter.

IsCached : An xs:boolean attribute that specifies whether the ActionParameter is used frequently. This MAY [<35>](#) be used as a recommendation as to whether to cache the ActionParameter. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The ActionParameter is infrequently used.
True	The ActionParameter is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="ActionParameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:attribute name="Index" type="bdc:Ordinal" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.1.4.37 Association

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [MethodInstances](#)

A complex type that specifies an Association.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Association.

Properties : A [Properties](#) element that specifies the Properties of the Association.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Association.

SourceEntity : A [SourceEntity](#) element that specifies a source Entity of the Association.

DestinationEntity : A [DestinationEntity](#) element that specifies the destination Entity of the Association.

Attributes:

Type : A [MethodInstanceType](#) attribute that specifies the type of the Association.

Default : An xs:boolean attribute that specifies whether the Association is the default among all Associations sharing its type within the containing Entity. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Association is not the default among all Associations sharing its type within the containing Entity.

Value	Description
True	The Association is the default among all Associations sharing its type within the containing Entity.

ReturnParameterName : A [NameString](#) attribute that specifies the name of the Parameter that contains the ReturnPropertyDescriptor of the Association. The Direction attribute of the Parameter MUST have a value of either "Out", "InOut" or "Return".

This attribute MUST be specified for all types of Associations except **Associator** and **Disassociator**.

ReturnPropertyDescriptorName : A NameString attribute that specifies the name of the ReturnPropertyDescriptor of the Association. The Parameter specified by the ReturnParameterName attribute MUST contain the ReturnPropertyDescriptor. This attribute MUST be ignored when ReturnPropertyDescriptorPath attribute is specified. This attribute SHOULD NOT [<36>](#) be used.

When this attribute is missing, and the ReturnPropertyDescriptorPath attribute is not specified, the application utilizing the structure MUST assume the name of the ReturnPropertyDescriptor to be the name of the root TypeDescriptor of the Parameter specified by the ReturnParameterName attribute.

ReturnPropertyDescriptorLevel : A [ReturnPropertyDescriptorLevel](#) attribute that specifies the depth from the root of the ReturnPropertyDescriptor of the Association, in the tree of nested TypeDescriptors where the root level equals 0. This attribute MUST be ignored. This attribute SHOULD NOT [<37>](#) be used.

ReturnPropertyDescriptorPath : A [TypeDescriptorPathString](#) attribute that specifies the path [<38>](#) to the return value of the Association.

When this attribute is missing, and the ReturnPropertyDescriptorName attribute is not specified, the application utilizing the structure MUST assume the name of the ReturnPropertyDescriptor to be the name of the root TypeDescriptor of the Parameter specified by the ReturnParameterName attribute.

Name : A NameString attribute that specifies the name of the Association.

DefaultDisplayName : A NameString attribute that specifies the default display name of the Association.

IsCached : An xs:boolean attribute that specifies whether the Association is used frequently. This MAY [<39>](#) be used as a recommendation as to whether to cache the Association. This attribute MUST be set to one of the values listed in the following table.

Value	Description
False	The Association is infrequently used.
True	The Association is frequently used.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Association">
  <xs:complexContent>
    <xs:extension base="bdc:MethodInstance">
      <xs:sequence>
        <xs:element name="SourceEntity" type="bdc:SourceEntity" minOccurs="1"
maxOccurs="unbounded"/>
        <xs:element name="DestinationEntity" type="bdc:DestinationEntity" minOccurs="1"
maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

```

        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

```

2.1.4.38 SourceEntity

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Association](#)

A complex type that specifies a source Entity of an Association.

Attributes:

Namespace : A [NameString](#) attribute that specifies the namespace of the Entity that is a source of the Association containing this element.

Name : A NameString attribute that specifies the name of the Entity that is a source of the Association containing this element.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="SourceEntity">
  <xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
  <xs:attribute name="Name" type="bdc:NameString" use="required"/>
</xs:complexType>

```

2.1.4.39 DestinationEntity

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Association](#)

A complex type that specifies the destination Entity of an Association.

Attributes:

Namespace : A [NameString](#) attribute that specifies the namespace of the Entity that is the destination of the Association containing this element.

Name : A NameString attribute that specifies the name of the Entity that is the destination of the Association containing this element.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="DestinationEntity">
  <xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
  <xs:attribute name="Name" type="bdc:NameString" use="required"/>
</xs:complexType>

```

2.1.4.40 Property

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Properties](#)

A complex type that specifies the name and type of a Property. The text associated with this element is the value of the Property with the specified name for the containing MetadataObject.

Attributes:

Name : A [NameString](#) attribute that specifies the Property name.

Type : A [TypeNameString](#) attribute that specifies data type of the Property.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Property" mixed="true">
  <xs:attribute name="Name" type="bdc:NameString" use="required"/>
  <xs:attribute name="Type" type="bdc:TypeNameString" use="required"/>
</xs:complexType>
```

2.1.4.41 Properties

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Model](#), [LobSystem](#), [LobSystemInstance](#), [MetadataObject](#), [Entity](#), [Identifier](#), [Method](#), [FilterDescriptor](#), [Parameter](#), [TypeDescriptor](#), [Association](#), [MethodInstance](#), [IndividuallySecurableMetadataObject](#), [AssociationGroup](#), [Action](#), [ActionParameter](#)

A complex type that specifies a list of Properties of a MetadataObject.

Child Elements:

Property : A [Property](#) element that specifies a Property.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Properties">
  <xs:sequence>
    <xs:element name="Property" type="bdc:Property" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.42 AccessControlList

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Model](#), [LobSystem](#), [Entity](#), [Method](#), [Association](#), [MethodInstance](#), [IndividuallySecurableMetadataObject](#)

A complex type that specifies an access control list (ACL).

Child Elements:

AccessControlEntry : An [AccessControlEntry](#) element that specifies an **access control entry (ACE)**.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="AccessControlList">
  <xs:sequence>
    <xs:element name="AccessControlEntry" type="bdc:AccessControlEntry" minOccurs="1"
      maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.1.4.43 AccessControlEntry

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [AccessControlList](#)

A complex type that specifies an access control entry (ACE) to specify access rights for the parent element.

Child Elements:

Right : A [Right](#) element that specifies the permissions available to the **security principal (2)**.

Attributes:

Principal : An xs:string attribute that specifies the name of the security principal (2). The value for this attribute **MUST** be as specified by the following ABNF.

```
principal = windows / membership / role / claim
windows = ["Windows" %x7C] ((domain "\\") / "") domainAccount
membership = "Membership" %x7C membershipIssuer %x7C ((domain "\\") / "")
  domainAccount
role = ["Role" %x7C] roleIssuer %x7C ((domain "\\") / "") domainAccount
claim = "STS" %x7C trustedSTS %x7C claimType %x7C claimValue %x7C
  claimValueType
claimValueType = "String"
```

The domain rule is the **domain name** of the security principal (2).

The domainAccount rule corresponds to the **domain account** of the security principal (2).

The membershipIssuer rule conforms to the format of an original issuer as specified in [\[MS-SPSTWS\]](#) section 2.2.2.

The roleIssuer rule conforms to the format of an original issuer as specified in [\[MS-SPSTWS\]](#) section 2.2.2.

The trustedSTS rule corresponds to the trusted STS as specified in [\[MS-SPSTWS\]](#) section 2.2.2.

The claimType rule corresponds to the claim type URI as specified in [\[MS-SPSTWS\]](#) section 2.2.2.

The claimValue is a **claim value**.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="AccessControlEntry">
  <xs:sequence>
    <xs:element name="Right" type="bdc:Right" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="Principal" type="xs:string" use="required"/>
</xs:complexType>
```

2.1.4.44 Right

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [AccessControlEntry](#)

A complex type that specifies a single access permission for an access control entry (ACE).

Attributes:

BdcRight : A [BdcRightName](#) attribute that specifies the permission level of a Right element.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Right">
  <xs:attribute name="BdcRight" type="bdc:BdcRightName" use="required"/>
</xs:complexType>
```

2.1.5 Simple Types

The following simple types are used as specified by [\[XMLSCHEMA1\]](#) and [\[XMLSCHEMA2\]](#):

- xs:boolean
- xs:integer
- xs:string

2.1.5.1 LobSystemType

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [LobSystem](#)

A simple type specifying the type of line-of-business (LOB) system that a LobSystem is representing. The attributes and settings describing the line-of-business (LOB) system MUST be stored as Properties on the LobSystem, as specified in section [2.1.4.40](#). The value MUST be listed in the following table.

Value	Meaning
Database	The represented line-of-business (LOB) system is a database.
DotNetAssembly	The represented line-of-business (LOB) system is a set of Business Logic

Value	Meaning
	Modules<40>.
Wcf	The represented line-of-business (LOB) system is a service for which the endpoint URI, the binding and the contract is specified.
WebService	The represented line-of-business (LOB) system is a Web service .
Custom	The represented line-of-business (LOB) system is a line-of-business (LOB) system for which external business logic manages the connection and data transfer through an implementation-specific extensibility mechanism.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="LobSystemType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Database"/>
    <xs:enumeration value="DotNetAssembly"/>
    <xs:enumeration value="Wcf"/>
    <xs:enumeration value="WebService"/>
    <xs:enumeration value="Custom"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.2 OperationModeType

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

A simple type specifying how a consumer of the structure interacts with a line-of-business (LOB) system when utilizing an implementation-specific cache of EntityInstances, when creating, deleting, updating or reading EntityInstance data in an implementation-specific manner. The value **MUST** be listed in the following table.

Value	Meaning
Online	Bypass the cached EntityInstances for all operations and interact with the line-of-business (LOB) system directly.
Cached	Perform create, read, update and delete operations directly against the cached EntityInstances. For read operations, if the requested EntityInstances are available in the cache, use the EntityInstances in the cache. Otherwise, bypass the cache to obtain the EntityInstance data from the line-of-business (LOB) system, and put it into the cache for later use.
Offline	Perform create, read, update and delete operations only against the cached EntityInstances.
Default	Make an implementation-specific choice to use any one of the other behaviors listed in this table based on capabilities of the consumer of this structure.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="OperationModeType">
```

```

<xs:restriction base="xs:string">
  <xs:enumeration value="Online"/>
  <xs:enumeration value="Cached"/>
  <xs:enumeration value="Offline"/>
  <xs:enumeration value="Default"/>
</xs:restriction>
</xs:simpleType>

```

2.1.5.3 IdentifierType

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Identifier](#)

A simple type that specifies the data type of the value corresponding to the Identifier. The value **MUST** be listed in the following table.

Value	Meaning
System.Boolean	A bit.
System.Byte	A number ranging from 0 to 255 inclusive.
System.Char	A Unicode character.
System.DateTime	A date and time ranging from 12:00:00 midnight, January 1, 1 Anno Domini (Common Era) to 11:59:59 P.M., December 31, 9999 Anno Domini (Common Era) inclusive, in resolution of 100 nanoseconds.
System.Decimal	A number ranging from negative 79,228,162,514,264,337,593,543,950,335 to positive 79,228,162,514,264,337,593,543,950,335 inclusive.
System.Double	A double precision number ranging from negative 1.79769313486232e308 to positive 1.79769313486232e308 inclusive, as well as positive zero, negative zero, positive infinity, negative infinity and not-a-number (NaN).
System.Guid	A GUID .
System.Int16	A number ranging from negative 32768 to positive 32767 inclusive.
System.Int32	A number ranging from negative 2,147,483,648 to positive 2,147,483,647 inclusive.
System.Int64	A number ranging from negative 9,223,372,036,854,775,808 to positive 9,223,372,036,854,775,807 inclusive.
System.SByte	A number ranging from negative 128 to positive 127 inclusive.
System.Single	A single precision number ranging from negative 3.402823e38 to 3.402823e38 inclusive.
System.String	A string of Unicode text.
System.TimeSpan	A duration ranging from negative 10675199 days 2 hours 48 minutes 5 seconds 477 milliseconds 580 microseconds 800 nanoseconds to positive 10675199 days 2 hours 48 minutes 5 seconds 477 milliseconds 580 microseconds 700 nanoseconds inclusive, in resolution of 100 nanoseconds.
System.UInt16	A number ranging from 0 to 65535 inclusive.

Value	Meaning
System.UInt32	A number ranging from 0 to 4,294,967,295 inclusive.
System.UInt64	A number ranging from 0 to 18,446,744,073,709,551,615 inclusive.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="IdentifierType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="System.Boolean"/>
    <xs:enumeration value="System.Byte"/>
    <xs:enumeration value="System.Char"/>
    <xs:enumeration value="System.DateTime"/>
    <xs:enumeration value="System.Decimal"/>
    <xs:enumeration value="System.Double"/>
    <xs:enumeration value="System.Guid"/>
    <xs:enumeration value="System.Int16"/>
    <xs:enumeration value="System.Int32"/>
    <xs:enumeration value="System.Int64"/>
    <xs:enumeration value="System.SByte"/>
    <xs:enumeration value="System.Single"/>
    <xs:enumeration value="System.String"/>
    <xs:enumeration value="System.TimeSpan"/>
    <xs:enumeration value="System.UInt16"/>
    <xs:enumeration value="System.UInt32"/>
    <xs:enumeration value="System.UInt64"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.4 FilterDescriptorType

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [FilterDescriptor](#)

Specifies the type of a FilterDescriptor. The value MUST be listed in the following table.

Value	Meaning
Limit	The FilterDescriptor is a LimitFilter .
PageNumber	The FilterDescriptor is a PageNumberFilter .
Wildcard	The FilterDescriptor is a WildcardFilter .
UserContext	The FilterDescriptor is a UserContextFilter .
UserCulture	The FilterDescriptor is a UserCultureFilter .
Username	The FilterDescriptor is a UsernameCredentialFilter .
Password	The FilterDescriptor is a PasswordCredentialFilter .
LastId	The FilterDescriptor is a LastIdFilter .

Value	Meaning
SsoTicket	The FilterDescriptor is an SsoTicketFilter .
UserProfile	The FilterDescriptor is a UserProfileFilter .
Comparison	The FilterDescriptor is a ComparisonFilter .
Timestamp	The FilterDescriptor is a TimeStampFilter .
Input	The FilterDescriptor is an InputFilter .
Output	The FilterDescriptor is an OutputFilter .
InputOutput	The FilterDescriptor is an InputOutputFilter .
Batching	The FilterDescriptor is a BatchingPositionFilter .
BatchingTermination	The FilterDescriptor is a BatchingTerminationFilter .
ActivityId	The FilterDescriptor is an ActivityTrackingFilter .

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="FilterDescriptorType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Limit"/>
    <xs:enumeration value="PageNumber"/>
    <xs:enumeration value="Wildcard"/>
    <xs:enumeration value="UserContext"/>
    <xs:enumeration value="UserCulture"/>
    <xs:enumeration value="Username"/>
    <xs:enumeration value="Password"/>
    <xs:enumeration value="LastId"/>
    <xs:enumeration value="SsoTicket"/>
    <xs:enumeration value="UserProfile"/>
    <xs:enumeration value="Comparison"/>
    <xs:enumeration value="Timestamp"/>
    <xs:enumeration value="Input"/>
    <xs:enumeration value="Output"/>
    <xs:enumeration value="InputOutput"/>
    <xs:enumeration value="Batching"/>
    <xs:enumeration value="BatchingTermination"/>
    <xs:enumeration value="ActivityId"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.5 TypeDescriptorPathString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Association](#), [MethodInstance](#)

Specifies the method to obtain a part of a data structure described by TypeDescriptors, given a set of root data structures and corresponding TypeDescriptors. The value MUST be in the following format as expressed in ABNF as specified in [\[RFC5234\]](#):

```

Path = StartField *(FieldAccess / Indexer)

PathToken = StartField / FieldAccess / Indexer

StartField = Field

FieldAccess = %x2E Field

Indexer = %x5B Index %x5D

Index = 1*DIGIT

Field = %x01-2D / %x2F-5A / %x5E-FF / EscapedDot / EscapedBracket / EscapedSlash

EscapedDot = %x5C %x2E

EscapedBracket = %x5C %x5B

EscapedSlash = %x5C %x5C

```

Field rule specifies a TypeDescriptor name when the EscapedDot, EscapedBracket and EscapedSlash rules are replaced with the following:

```

EscapedDot = %x2E

EscapedBracket = %x5B

EscapedSlash = %x5C

```

The StartField rule specifies the TypeDescriptor that has the name equal to the name specified by Field rule.

The FieldAccess rule specifies the TypeDescriptor that has the name equal to the name specified by Field rule, which is contained by the given TypeDescriptor. The given TypeDescriptor MUST have IsCollection attribute set to false.

The Indexer rule specifies the only TypeDescriptor contained by the given TypeDescriptor. The given TypeDescriptor MUST have IsCollection attribute set to true.

The Index rule specifies the zero based integer index of a data structure in a collection of data structures.

Given a set of data structures and their corresponding TypeDescriptors, the path string MUST be evaluated to return the specified data structure as follows:

INIT CurrentTypeDescriptor

INIT CurrentDataStructure

FOR each PathToken in Path from left to right

IF PathToken is StartField THEN

SET CurrentTypeDescriptor to the TypeDescriptor specified by StartField from given TypeDescriptors

SET CurrentDataStructure to the data structure corresponding to CurrentTypeDescriptor from given data structures

ELSE IF PathToken is FieldAccess THEN

SET CurrentTypeDescriptor to the TypeDescriptor specified by FieldAccess given
CurrentTypeDescriptor

SET CurrentDataStructure to the data structure represented by the LobName attribute of
CurrentTypeDescriptor from CurrentDataStructure

ELSE IF PathToken is Indexer THEN

SET CurrentTypeDescriptor to the TypeDescriptor specified by Indexer given CurrentTypeDescriptor

SET CurrentDataStructure to the data structure at index specified by Index within
CurrentDataStructure

END IF

END LOOP

RETURN CurrentDataStructure

For a specified Path all the specified TypeDescriptors MUST be available.

For example:

Given following data structure (represented in "<property name> : <property value>" pairing)

- Customer
 - Name : "Claus"
 - Surname : "Hansen"
 - Addresses : Collection of Address data structures
 - Address
 - Street : "1 Road"
 - Zip : "00001"
 - Address
 - Street : "2 Road"
 - Zip : "00002"
 - Address
 - Street : "3 Road"
 - Zip : "00003"

And the corresponding TypeDescriptor structure (represented in "<name>, <lob name>, <Iscollection>" attribute triplets)":

- Customer, Customer, false
 - Name, Name, false

- Last Name, Surname, false
- Addresses, Addresses, true
 - Address, Address, false
 - Street, Street, false
 - ZipCode, Zip, false

The path "Customer.Addresses[1].ZipCode" specifies the data structure name "Zip" with value "00002"; The path "Customer.LastName" specifies the data structure with name "Surname" with value "Hansen"; And the path "Customer.Addresses" specifies the data structure with name "Addresses" that contains a collection of Address data structures.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="TypeDescriptorPathString">
  <xs:restriction base="xs:string"/>
</xs:simpleType>
```

2.1.5.6 MethodInstanceType

Target namespace: http://schemas.microsoft.com/windows/2007/BusinessDataCatalog

Referenced by: [Association](#), [MethodInstance](#)

Specifies the type of MethodInstance. The value MUST be listed in the following table.

Value	Meaning
Finder	The MethodInstance is a Finder .
SpecificFinder	The MethodInstance is a SpecificFinder .
GenericInvoker	The MethodInstance is a GenericInvoker.
IdEnumerator	The MethodInstance is an IdEnumerator .
ChangedIdEnumerator	The MethodInstance is a ChangedIdEnumerator .
DeletedIdEnumerator	The MethodInstance is a DeletedIdEnumerator .
Scalar	The MethodInstance is a Scalar .
AccessChecker	The MethodInstance is an AccessChecker .
AssociationNavigator	The MethodInstance is an AssociationNavigator .
Associator	The MethodInstance is an Associator.
Disassociator	The MethodInstance is a Disassociator.
Creator	The MethodInstance is a Creator.
Deleter	The MethodInstance is a Deleter.

Value	Meaning
Updater	The MethodInstance is an Updater.
StreamAccessor	The MethodInstance is a StreamAccessor .
BinarySecurityDescriptorAccessor	The MethodInstance is a BinarySecurityDescriptorAccessor .
BulkSpecificFinder	The MethodInstance is a BulkSpecificFinder .
BulkAssociatedIdEnumerator	The MethodInstance is a BulkAssociatedIdEnumerator .
BulkAssociationNavigator	The MethodInstance is a BulkAssociationNavigator .
BulkIdEnumerator	The MethodInstance is a BulkIdEnumerator .

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="MethodInstanceType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Finder"/>
    <xs:enumeration value="SpecificFinder"/>
    <xs:enumeration value="GenericInvoker"/>
    <xs:enumeration value="IdEnumerator"/>
    <xs:enumeration value="ChangedIdEnumerator"/>
    <xs:enumeration value="DeletedIdEnumerator"/>
    <xs:enumeration value="Scalar"/>
    <xs:enumeration value="AccessChecker"/>
    <xs:enumeration value="AssociationNavigator"/>
    <xs:enumeration value="Associator"/>
    <xs:enumeration value="Disassociator"/>
    <xs:enumeration value="Creator"/>
    <xs:enumeration value="Deleter"/>
    <xs:enumeration value="Updater"/>
    <xs:enumeration value="StreamAccessor"/>
    <xs:enumeration value="BinarySecurityDescriptorAccessor"/>
    <xs:enumeration value="BulkSpecificFinder"/>
    <xs:enumeration value="BulkAssociatedIdEnumerator"/>
    <xs:enumeration value="BulkAssociationNavigator"/>
    <xs:enumeration value="BulkIdEnumerator"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.7 ParameterDirection

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Parameter](#)

ParameterDirection specifies the directionality of a Parameter. The value **MUST** be listed in the following table.

Value	Meaning
In	The represented Parameter is an input parameter.

Value	Meaning
Out	The represented Parameter is an output parameter.
InOut	The represented Parameter is an input and output parameter.
Return	The represented Parameter is a return parameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="ParameterDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="In"/>
    <xs:enumeration value="Out"/>
    <xs:enumeration value="InOut"/>
    <xs:enumeration value="Return"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.8 StringNormalizeMode

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [NormalizeString](#)

A simple type specifying the conversion between representations of an empty string and null values for NormalizeString rule. The value MUST be listed in the following table.

Value	Meaning
NoChange	The value MUST NOT be modified when the rule is applied.
NormalizeToEmptyString	When the value is null value, it MUST be replaced with an empty string.
NormalizeToNull	When the value is empty string, it MUST be replaced with a null value.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="StringNormalizeMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="NoChange"/>
    <xs:enumeration value="NormalizeToEmptyString"/>
    <xs:enumeration value="NormalizeToNull"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.9 LobDateTimeMode

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [NormalizeDateTime](#)

A simple type specifying the conversion between representations of date and time values for a NormalizeDateTime rule. The value **MUST** be listed in the following table.

Value	Meaning
UTC	The value is represented in UTC (Coordinated Universal Time). When the rules are applied in order, and if the value has an unknown time zone, the value MUST be assumed to be in UTC. When the rules are applied in reverse order, the value MUST be converted to UTC representation.
Local	The value is represented in local time zone. When the rules are applied in order, and if the value is represented in an unknown time zone, the value MUST assumed to be in local time. When the rules are applied in reverse order, the value MUST be converted to local time zone.
Unspecified	The value is not represented in any time zone. When the rules are applied in order, and if the value has an unknown time zone, the value MUST be assumed to be in UTC. When the rules are applied in reverse order, the time zone information MUST be removed.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="LobDateTimeMode">
  <xs:restriction base="xs:string">
    <xs:enumeration value="UTC"/>
    <xs:enumeration value="Local"/>
    <xs:enumeration value="Unspecified"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.10 Ordinal

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [ActionParameter](#)

An ordering of integers describing the position of an element in a sequence.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="Ordinal">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.11 InstanceCount

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

The estimated number of EntityInstances of an Entity.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="InstanceCount">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.12 ReturnPropertyDescriptorLevel

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Association](#), [MethodInstance](#)

The depth from the root of the ReturnPropertyDescriptor of the MethodInstance or Association, in the tree of nested TypeDescriptors where the root level equals 0.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="ReturnPropertyDescriptorLevel">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="29"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.13 ActionPosition

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Action](#)

The value of ActionPosition specifies the position of this Action among the other Actions of this Entity. The order of the Actions represented in the user interface is implementation-specific.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="ActionPosition">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="1"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.14 BdcRightName

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Right](#)

The value of BdcRightName specifies the permission available to the security principal (2) holding a Right. The value MUST be listed in the following table.

Value	Meaning
None	No permissions.
Execute	The represented security principal (2) has the permission to call a MethodInstance.
Edit	The represented security principal (2) has permission to change the attributes of a MetadataObject or its relationship to other MetadataObjects.
SetPermissions	The represented security principal (2) has permission to change the set of permissions for a MetadataObject.
SelectableInClients	The represented security principal (2) has permission to select the MetadataObject this right refers to in an implementation-specific user interface from a list of available MetadataObjects. If the security principal (2) does not have this permission, the MetadataObject SHOULD NOT be presented in such a list.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="BdcRightName">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None"/>
    <xs:enumeration value="Execute"/>
    <xs:enumeration value="Edit"/>
    <xs:enumeration value="SetPermissions"/>
    <xs:enumeration value="SelectableInClients"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.15 NameString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Model](#), [Property](#), [LobSystem](#), [LobSystemInstance](#), [MetadataObject](#), [Entity](#), [Identifier](#), [Method](#), [FilterDescriptor](#), [Parameter](#), [TypeDescriptor](#), [DefaultValue](#), [Association](#), [SourceEntity](#), [DestinationEntity](#), [MethodInstance](#), [IndividuallySecurableMetadataObject](#), [AssociationGroup](#), [AssociationReference](#), [Action](#), [ActionParameter](#)

A simple type used to specify MetadataObject names.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="NameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.16 TypeDescriptorTypeNameString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [TypeDescriptor](#), [DefaultValue](#)

A simple type used to specify implementation-specific identifier for data type of the data structure that the TypeDescriptor represents. The value of this element is mapped to a data type using an implementation-specific Business Logic Module<41> associated with the Parameter which contains this TypeDescriptor. The Business Logic Module<42> that can perform this mapping MUST be specified as follows.

1. If the Parameter that contains this TypeDescriptor contains a Property with name "TypeReflectorTypeName" and type "System.String", the Business Logic Module<43> specified by the implementation-specific identifier represented by the string Property value MUST be used.
2. If previous condition is not met, and if the LobSystem that contains the Entity containing the Method of the Parameter that contains this TypeDescriptor has section [type](#) specified as "Custom", and if the Business Logic Module<44> associated with the LobSystem for the purposes of communicating with the corresponding line-of-business (LOB) system, which is identified by the value of the LobSystem contained Property with name "SystemUtilityTypeName" and type "System.String", specifies a Business Logic Module<45> for the purpose of mapping value of typeName element to a data type, the specified Business Logic Module<46> MUST be used.
3. If previous conditions are not met, implementation-specific Business Logic Module<47> MUST be used to perform the mapping. In this case, the value of the implementation-specific identifier for the data type of the data structure that the TypeDescriptor represents MUST be in the format specified by the following ABNF.

```
Value = TypeName *1(%x2C BusinessLogicModule)
BusinessLogicModule = FullAssemblyName / LobSystemName
FullAssemblyName = LibraryIdentifier %x2C VersionProperty %x2C CultureProperty %x2C
PublicKeyTokenProperty
```

Where LibraryIdentifier, VersionProperty, PublicKeyTokenProperty and CultureProperty rules are as specified in [\[MS-NRTP\]](#) section 2.2.1.3.

The TypeName rule is the name of the type that conforms to the [\[ECMA-335\]](#) specification and can be understood by the .NET Framework. The format is as specified in [\[MS-NRTP\]](#) section 2.2.1.2.

The LobSystemName rule is the name of the LobSystem which contains the Entity which contains the Method which contains the Parameter which contains the TypeDescriptor.

The occurrence of BusinessLogicModule in the preceding ABNF MUST yield to a LobSystemName, if the represented data type resides in the Business Logic Module<48> associated with the LobSystem which contains the TypeDescriptor, otherwise the occurrence of BusinessLogicModule MUST be a FullAssemblyName. The values specified in the following table do not require a BusinessLogicModule to be specified.

Value	Description
System.String	A string of Unicode text.
System.Int16	A number ranging from negative 32768 to positive 32767 inclusive.
System.Int32	A number ranging from negative 2,147,483,648 to positive 2,147,483,647 inclusive.
System.Int64	A number ranging from negative 9,223,372,036,854,775,808 to positive 9,223,372,036,854,775,807 inclusive.

Value	Description
System.UInt16	A number ranging from 0 to 65535 inclusive.
System.UInt32	A number ranging from 0 to 4,294,967,295 inclusive.
System.UInt64	A number ranging from 0 to 18,446,744,073,709,551,615 inclusive.
System.DateTime	A date and time ranging from 12:00:00 midnight, January 1, 1 Anno Domini (Common Era) to 11:59:59 P.M., December 31, 9999 Anno Domini (Common Era) inclusive, in resolution of 100 nanoseconds.
System.TimeSpan	A duration ranging from negative 10675199 days 2 hours 48 minutes 5 seconds 477 milliseconds 580 microseconds 800 nanoseconds to positive 10675199 days 2 hours 48 minutes 5 seconds 477 milliseconds 580 microseconds 700 nanoseconds inclusive, in resolution of 100 nanoseconds.
System.Single	A single precision number ranging from negative 3.402823e38 to 3.402823e38 inclusive.
System.Double	A double precision number ranging from negative 1.79769313486232e308 to positive 1.79769313486232e308 inclusive as well as positive zero, negative zero, positive infinity, negative infinity and not-a-number (NaN).
System.Decimal	A number ranging from negative 79,228,162,514,264,337,593,543,950,335 to positive 79,228,162,514,264,337,593,543,950,335 inclusive.
System.Char	A Unicode character.
System.Byte	A number ranging from 0 to 255 inclusive.
System.SByte	A number ranging from negative 128 to positive 127 inclusive.
System.Guid	A GUID.
System.Boolean	A bit.
System.Uri	An URL.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="TypeDescriptorTypeNameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
```

2.1.5.17 TypeNameString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Property](#), [ConvertType](#)

A simple type used to specify data types. The value **MUST** be in the format specified by the following ABNF.

```

Identifier = TypeName *1(%x2C FullAssemblyName)
FullAssemblyName = LibraryIdentifier %x2C VersionProperty %x2C CultureProperty %x2C
PublicKeyTokenProperty

```

Where LibraryIdentifier, VersionProperty, PublicKeyTokenProperty, and CultureProperty are as specified in [\[MS-NRTP\]](#) section 2.2.1.3.

TypeName: The name of the type that conforms to the [\[ECMA-335\]](#) specification and can be understood by the .NET Framework. The format is as specified in [\[MS-NRTP\]](#) section 2.2.1.2.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```

<xs:simpleType name="TypeNameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>

```

2.1.5.18 UrlString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Action](#)

A simple type used to restrict the length of URL (Uniform Resource Locator) attributes.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```

<xs:simpleType name="UrlString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="2080"/>
  </xs:restriction>
</xs:simpleType>

```

2.1.5.19 VersionString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog>

Referenced by: [Entity](#)

A set of 4 numeric values separated by dots that represent the version of the parent element.

The first numerical value represents the major version, the second numerical value represents the minor version, the third numerical value represents the build version and the forth numerical value represents the revision version.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```

<xs:simpleType name="VersionString">

```



```

<xs:restriction base="xs:string">
  <xs:pattern value="[0-9]+(\.[0-9]+){1,3}" />
</xs:restriction>
</xs:simpleType>

```

2.2 Metadata Model Resources

2.2.1 Namespaces

This specification defines and references various XML namespaces using the mechanisms specified in [\[XMLNS\]](#). Although this specification associates a specific XML namespace prefix for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

Prefix	Namespace URI	Reference
xs	http://www.w3.org/2001/XMLSchema	[XMLSCHEMA1] [XMLSCHEMA2]
bdc	http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources	

2.2.2 Global Elements

2.2.2.1 Model

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

A [Model](#) element that identifies a Model.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this element.

```
<xs:element name="Model" type="bdc:Model"/>
```

2.2.3 Global Attributes

None.

2.2.4 Complex Types

2.2.4.1 Model

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Model](#)

A complex type that identifies a Model.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Model.

Properties : A [Properties](#) element that specifies the Properties of the Model.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Model.

LobSystems : A [LobSystems](#) element that specifies the LobSystems of the Model.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Model.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Model">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="LobSystems" type="bdc:LobSystems" minOccurs="0" maxOccurs="1">
          <xs:unique name="LobSystemNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name" />
          </xs:unique>
        </xs:element>
      </xs:sequence>
      <xs:attribute name="Name" type="bdc:NameString" use="required" />
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.2 LobSystems

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Model](#)

A complex type that identifies a list of LobSystems of a Model.

Child Elements:

LobSystem : A [LobSystem](#) element that specifies a LobSystem.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LobSystems">
  <xs:sequence>
    <xs:element name="LobSystem" type="bdc:LobSystem" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

2.2.4.3 MetadataObject

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [LobSystemInstance](#), [Identifier](#), [FilterDescriptor](#), [TypeDescriptor](#), [Parameter](#), [IndividuallySecurableMetadataObject](#), [AssociationGroup](#), [ActionParameter](#), [Action](#)

A complex type that identifies a MetadataObject.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the MetadataObject.

Properties : A [Properties](#) element that specifies the Properties of the MetadataObject.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the MetadataObject.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="MetadataObject" abstract="true">
  <xs:sequence>
    <xs:element name="LocalizedDisplayNames" type="bdc:LocalizedDisplayNames" minOccurs="0"
      maxOccurs="1">
      <xs:unique name="LocalizedDisplayNameLCIDKey">
        <xs:selector xpath="*/">
        <xs:field xpath="@LCID"/>
      </xs:unique>
    </xs:element>
    <xs:element name="Properties" type="bdc:Properties" minOccurs="0" maxOccurs="1">
      <xs:unique name="PropertyNameKey">
        <xs:selector xpath="*/">
        <xs:field xpath="@Name"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="Name" type="bdc:NameString" use="required"/>
</xs:complexType>
```

2.2.4.4 IndividuallySecurableMetadataObject

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Association](#), [MethodInstance](#), [Method](#), [Entity](#), [LobSystem](#), [Model](#)

A complex type that identifies a MetadataObject that can be assigned a specific access control list (ACL).

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the MetadataObject.

Properties : A [Properties](#) element that specifies the Properties of the MetadataObject.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the MetadataObject.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the MetadataObject.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="IndividuallySecurableMetadataObject" abstract="true">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="AccessControlList" type="bdc:AccessControlList" minOccurs="0"
maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.5 LocalizedDisplayNames

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Model](#), [LobSystem](#), [LobSystemInstance](#), [MetadataObject](#), [Entity](#), [Identifier](#), [Method](#), [FilterDescriptor](#), [Parameter](#), [TypeDescriptor](#), [Association](#), [IndividuallySecurableMetadataObject](#), [MethodInstance](#), [AssociationGroup](#), [Action](#), [ActionParameter](#)

A complex type that specifies a list of localized names of a MetadataObject.

Child Elements:

LocalizedDisplayName : A [LocalizedDisplayName](#) element that specifies a localized name.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LocalizedDisplayNames">
  <xs:sequence>
    <xs:element name="LocalizedDisplayName" type="bdc:LocalizedDisplayName" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.6 LocalizedDisplayName

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [LocalizedDisplayNames](#)

A complex type that specifies a localized name. The text associated with this element is the localized name associated with the specified language code identifier (LCID).

Attributes:

LCID : An xs:integer attribute that specifies the language code identifier (LCID).

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LocalizedDisplayName" mixed="true">
  <xs:attribute name="LCID" type="xs:integer" use="required"/>
</xs:complexType>
```

2.2.4.7 LobSystem

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [LobSystems](#)

A complex type that identifies a LobSystem.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the LobSystem.

Properties : A [Properties](#) element that specifies the Properties of the LobSystem.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the LobSystem.

LobSystemInstances : A [LobSystemInstances](#) element that specifies a list of LobSystemInstances of the LobSystem.

Entities : An [Entities](#) element that specifies a list of Entities of the LobSystem.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the LobSystem.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="LobSystem">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="LobSystemInstances" type="bdc:LobSystemInstances" minOccurs="0"
maxOccurs="1">
          <xs:unique name="LobSystemInstanceNameKey">
            <xs:selector xpath="*/">
              <xs:field xpath="@Name"/>
            </xs:unique>
          </xs:element>
        <xs:element name="Entities" type="bdc:Entities" minOccurs="0" maxOccurs="1">
          <xs:unique name="EntityNameNamespaceVersionKey">
            <xs:selector xpath="*/">
              <xs:field xpath="@Name"/>
              <xs:field xpath="@Namespace"/>
              <xs:field xpath="@Version"/>
            </xs:unique>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
```

```

    </xs:extension>
  </xs:complexContent>
</xs:complexType>

```

2.2.4.8 LobSystemInstances

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [LobSystem](#)

A complex type that identifies a list of LobSystemInstances of a LobSystem.

Child Elements:

LobSystemInstance : A [LobSystemInstance](#) element that specifies a LobSystemInstance.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="LobSystemInstances">
  <xs:sequence>
    <xs:element name="LobSystemInstance" type="bdc:LobSystemInstance" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

2.2.4.9 LobSystemInstance

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [LobSystemInstances](#)

A complex type that identifies a LobSystemInstance of a LobSystem.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the LobSystemInstance.

Properties : A [Properties](#) element that specifies the Properties of the LobSystemInstance.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the LobSystemInstance.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="LobSystemInstance">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>

```

2.2.4.10 Entities

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [LobSystem](#)

A complex type that identifies a list of Entities of a LobSystem.

Child Elements:

Entity : An [Entity](#) element that specifies an Entity.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Entities">
  <xs:sequence>
    <xs:element name="Entity" type="bdc:Entity" minOccurs="1" maxOccurs="unbounded">
      <xs:unique name="MethodInstanceNameKey">
        <xs:selector xpath="."/bdc:MethodInstances/*"/>
        <xs:field xpath="@Name"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
</xs:complexType>
```

2.2.4.11 Entity

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Entities](#)

A complex type that identifies an Entity.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Entity.

Properties : A [Properties](#) element that specifies the Properties of the Entity.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Entity.

Identifiers : An [Identifiers](#) element that specifies the Identifiers of the Entity.

Methods : A [Methods](#) element that specifies the Methods of the Entity.

AssociationGroups : An [AssociationGroups](#) element that specifies the AssociationGroups of the Entity.

Actions : An [Actions](#) element that specifies the Actions of the Entity.

Attributes:

Namespace : A [NameString](#) attribute that specifies the namespace of the Entity.

Version : A [VersionString](#) attribute that specifies the version number of the Entity.

Name : A NameString attribute that specifies the name of the Entity.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Entity">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="Identifiers" type="bdc:Identifiers" minOccurs="0">
          <xs:unique name="IdentifierNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Methods" type="bdc:Methods" minOccurs="0">
          <xs:unique name="MethodNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="AssociationGroups" type="bdc:AssociationGroups" minOccurs="0">
          <xs:unique name="AssociationGroupNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Actions" type="bdc:Actions" minOccurs="0">
          <xs:unique name="ActionNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
      </xs:sequence>
      <xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
      <xs:attribute name="Version" type="bdc:VersionString" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.12 AssociationGroups

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Entity](#)

A complex type that identifies a list of AssociationGroups of an Entity.

Child Elements:

AssociationGroup : An [AssociationGroup](#) element that specifies an AssociationGroup.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="AssociationGroups">
  <xs:sequence>
```



```

    <xs:element name="AssociationGroup" type="bdc:AssociationGroup" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

2.2.4.13 AssociationGroup

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [AssociationGroups](#)

A complex type that identifies an AssociationGroup.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the AssociationGroup.

Properties : A [Properties](#) element that specifies the Properties of the AssociationGroup.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the AssociationGroup.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="AssociationGroup">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>

```

2.2.4.14 Identifiers

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Entity](#)

A complex type that identifies a list of Identifiers of an Entity.

Child Elements:

Identifier : An [Identifier](#) element that specifies an Identifier.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="Identifiers">
  <xs:sequence>
    <xs:element name="Identifier" type="bdc:Identifier" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>

```

2.2.4.15 Identifier

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Identifiers](#)

A complex type that identifies an Identifier.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Identifier.

Properties : A [Properties](#) element that specifies the Properties of the Identifier.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Identifier.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Identifier">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.16 Methods

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Entity](#)

A complex type that identifies a list of Methods of an Entity.

Child Elements:

Method : A [Method](#) element that specifies a Method.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Methods">
  <xs:sequence>
    <xs:element name="Method" type="bdc:Method" minOccurs="1" maxOccurs="unbounded">
      <xs:key name="ParameterNameKey">
        <xs:selector xpath="."/>
        <xs:field xpath="@Name"/>
      </xs:key>
      <xs:key name="MethodMethodNameInstanceNameKey">
        <xs:selector xpath="."/>
        <xs:field xpath="@Name"/>
      </xs:key>
    </xs:element>
  </xs:sequence>
```

</xs:complexType>

2.2.4.17 Method

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Methods](#)

A complex type that identifies a Method.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Method.

Properties : A [Properties](#) element that specifies the Properties of the Method.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Method.

FilterDescriptors : A [FilterDescriptors](#) element that specifies the FilterDescriptors of the Method.

Parameters : A [Parameters](#) element that specifies the Parameters of the Method.

MethodInstances : A [MethodInstances](#) element that specifies the MethodInstances of the Method.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Method.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Method">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="FilterDescriptors" type="bdc:FilterDescriptors" minOccurs="0"
maxOccurs="1"/>
          <xs:unique name="FilterDescriptorNameKey">
            <xs:selector xpath="*/"/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Parameters" type="bdc:Parameters" minOccurs="0" maxOccurs="1"/>
        <xs:element name="MethodInstances" type="bdc:MethodInstances" minOccurs="0"
maxOccurs="1"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.18 FilterDescriptors

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Method](#)

A complex type that identifies a list of FilterDescriptors of a Method.

Child Elements:

FilterDescriptor : A [FilterDescriptor](#) element that specifies a FilterDescriptor.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="FilterDescriptors">
  <xs:sequence>
    <xs:element name="FilterDescriptor" type="bdc:FilterDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.19 FilterDescriptor

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [FilterDescriptors](#)

A complex type that identifies a FilterDescriptor.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the FilterDescriptor.

Properties : A [Properties](#) element that specifies the Properties of the FilterDescriptor.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the FilterDescriptor.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="FilterDescriptor">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.20 MethodInstances

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Method](#)

A complex type that identifies a list of MethodInstances of a Method.

Child Elements:

Association : An [Association](#) element that specifies an Association.

MethodInstance : A [MethodInstance](#) element that specifies a MethodInstance.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="MethodInstances">
  <xs:choice minOccurs="1" maxOccurs="unbounded">
    <xs:element name="Association" type="bdc:Association"/>
    <xs:element name="MethodInstance" type="bdc:MethodInstance"/>
  </xs:choice>
</xs:complexType>
```

2.2.4.21 MethodInstance

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [MethodInstances](#)

A complex type that identifies a MethodInstance.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the MethodInstance.

Properties : A [Properties](#) element that specifies the Properties of the MethodInstance.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the MethodInstance.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the MethodInstance.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="MethodInstance">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.22 Parameters

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Method](#)

A complex type that identifies a list of Parameters of a Method.

Child Elements:

Parameter : A [Parameter](#) element that specifies a Parameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Parameters">
  <xs:sequence>
    <xs:element name="Parameter" type="bdc:Parameter" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.23 Parameter

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Parameters](#)

A complex type that identifies a Parameter.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Parameter.

Properties : A [Properties](#) element that specifies the Properties of the Parameter.

TypeDescriptor : A [TypeDescriptor](#) element that specifies the root TypeDescriptor of the Parameter.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Parameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Parameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor"/>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.24 TypeDescriptor

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Parameter](#), [TypeDescriptors](#)

A complex type that identifies a TypeDescriptor.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the TypeDescriptor.

Properties : A [Properties](#) element that specifies the Properties of the TypeDescriptor.

TypeDescriptors : A TypeDescriptors element that specifies the child TypeDescriptors of the TypeDescriptor.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the TypeDescriptor.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="TypeDescriptor">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="TypeDescriptors" type="bdc:TypeDescriptors" minOccurs="0">
          <xs:unique name="TypeDescriptorNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name" />
          </xs:unique>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.25 TypeDescriptors

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [TypeDescriptor](#)

A complex type that identifies a list of child TypeDescriptors of a parent TypeDescriptor.

Child Elements:

TypeDescriptor : A TypeDescriptor element that specifies a TypeDescriptor.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="TypeDescriptors">
  <xs:sequence>
    <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor" minOccurs="1"
maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
```

2.2.4.26 Actions

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Entity](#)

A complex type that identifies a list of Actions of an Entity.

Child Elements:

Action : An [Action](#) element that specifies an Action.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Actions">
  <xs:sequence>
    <xs:element name="Action" type="bdc:Action" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.27 Action

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Actions](#)

A complex type that identifies an Action of an Entity.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Action.

Properties : A [Properties](#) element that specifies the Properties of the Action.

ActionParameters : An [ActionParameters](#) element that specifies the Parameters of the Action.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Action.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Action">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="ActionParameters" type="bdc:ActionParameters" minOccurs="0">
          <xs:unique name="ActionParameterNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name" />
          </xs:unique>
        </xs:element>
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.28 ActionParameters

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Action](#)

A complex type that identifies a list of ActionParameters of an Action.

Child Elements:

ActionParameter : An [ActionParameter](#) element that specifies an ActionParameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="ActionParameters">
  <xs:sequence>
    <xs:element name="ActionParameter" type="bdc:ActionParameter" minOccurs="1"
      maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.29 ActionParameter

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [ActionParameters](#)

A complex type that identifies an ActionParameter of an Action.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the ActionParameter.

Properties : A [Properties](#) element that specifies the Properties of the ActionParameter.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the ActionParameter.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="ActionParameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.30 Association

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [MethodInstances](#)

A complex type that identifies an Association.

Child Elements:

LocalizedDisplayNames : A [LocalizedDisplayNames](#) element that specifies the localized names of the Association.

Properties : A [Properties](#) element that specifies the Properties of the Association.

AccessControlList : An [AccessControlList](#) element that specifies the access control list (ACL) of the Association.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Association.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Association">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

2.2.4.31 Property

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Properties](#)

A complex type that specifies the name and type of a Property element. The text associated with this element is the value of the Property with the specified name for the containing MetadataObject.

Attributes:

Name : A [NameString](#) attribute that specifies the name of the Property.

Type : A section [TypeNameString](#) attribute that specifies data type of the Property.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Property" mixed="true">
  <xs:attribute name="Name" type="bdc:NameString" use="required"/>
  <xs:attribute name="Type" type="bdc:TypeNameString" use="required"/>
</xs:complexType>
```

2.2.4.32 Properties

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Model](#), [LobSystem](#), [LobSystemInstance](#), [MetadataObject](#), [Entity](#), [Identifier](#), [Method](#), [FilterDescriptor](#), [Parameter](#), [TypeDescriptor](#), [Association](#), [IndividuallySecurableMetadataObject](#), [MethodInstance](#), [AssociationGroup](#), [Action](#), [ActionParameter](#)

A complex type that specifies a list of Properties of a MetadataObject.

Child Elements:

Property : A [Property](#) element that specifies a Property.

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="Properties">
  <xs:sequence>
    <xs:element name="Property" type="bdc:Property" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.33 AccessControlList

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Model](#), [LobSystem](#), [Entity](#), [Method](#), [Association](#), [IndividuallySecurableMetadataObject](#), [MethodInstance](#)

A complex type that specifies an access control list (ACL).

Child Elements:

AccessControlEntry : An [AccessControlEntry](#) element that specifies an access control entry (ACE).

The following W3C XML Schema ([XMLSCHEMA1](#) section 2.1) fragment specifies the contents of this complex type.

```
<xs:complexType name="AccessControlList">
  <xs:sequence>
    <xs:element name="AccessControlEntry" type="bdc:AccessControlEntry" minOccurs="1"
      maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

2.2.4.34 AccessControlEntry

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [AccessControlList](#)

A complex type that specifies an access control entry (ACE) to specify access rights for the parent element.

Child Elements:

Right : A [Right](#) element that specifies the permissions available to the security principal (2).

Attributes:

Principal : An xs:string attribute that specifies the name of the security principal (2). The value for this attribute MUST be as specified by the following ABNF.

```
principal = windows / membership / role / claim
windows = ["Windows" %x7C] ((domain "\\") / "") domainAccount
membership = "Membership" %x7C membershipIssuer %x7C ((domain "\\") / "")
```

```

        domainAccount
    role = ["Role" %x7C] roleIssuer %x7C ((domain "\\") / "") domainAccount
    claim = "STS" %x7C trustedSTS %x7C claimType %x7C claimValue %x7C
        claimValueType
    claimValueType = "String"

```

The domain rule is the domain name of the security principal (2).

The domainAccount rule corresponds to the domain account of the security principal (2).

The membershipIssuer rule conforms to the format of a membership provider name as specified in [\[MS-SPSTWS\]](#) section 2.2.2.2.1.1.3.

The roleIssuer rule conforms to the format of a role provider name as specified in [\[MS-SPSTWS\]](#) section 2.2.2.2.1.1.3.

The trustedSTS rule conforms to the format of an STS name as specified in [\[MS-SPSTWS\]](#) section 2.2.2.2.1.1.3.

The claimType rule is the claim type URI as specified in [\[MS-SPSTWS\]](#) section 2.2.2.2.1.1.4.

The claimValue is a claim value.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="AccessControlEntry">
  <xs:sequence>
    <xs:element name="Right" type="bdc:Right" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="Principal" type="xs:string" use="required"/>
</xs:complexType>

```

2.2.4.35 Right

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [AccessControlEntry](#)

A complex type that specifies a single access permission for an access control entry (ACE).

Attributes:

BdcRight : A [BdcRightName](#) attribute that specifies permission level of a Right element.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this complex type.

```

<xs:complexType name="Right">
  <xs:attribute name="BdcRight" type="bdc:BdcRightName" use="required"/>
</xs:complexType>

```

2.2.5 Simple Types

The following simple types are used as specified by [\[XMLSCHEMA1\]](#) and [\[XMLSCHEMA2\]](#):

- xs:boolean
- xs:integer
- xs:string

2.2.5.1 BdcRightName

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Right](#)

The value of BdcRightName specifies the permission available to the security principal (2) holding a [Right](#). The value MUST be listed in the following table.

Value	Meaning
None	No permissions
Execute	The represented security principal (2) has the permission to call a MethodInstance
Edit	The represented security principal (2) has permission to change the attributes of a MetadataObject or its relationship to other MetadataObjects.
SetPermissions	The represented security principal (2) has permission to change the set of permissions for a MetadataObject.
SelectableInClients	The represented security principal (2) has permission to select the MetadataObject this right refers to in an implementation-specific user interface from a list of available MetadataObjects. If the security principal (2) does not have this permission, the MetadataObject SHOULD NOT be presented in such a list.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="BdcRightName">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None"/>
    <xs:enumeration value="Execute"/>
    <xs:enumeration value="Edit"/>
    <xs:enumeration value="SetPermissions"/>
    <xs:enumeration value="SelectableInClients"/>
  </xs:restriction>
</xs:simpleType>
```

2.2.5.2 NameString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Model](#), [Property](#), [LobSystem](#), [LobSystemInstance](#), [MetadataObject](#), [Entity](#), [Identifier](#), [Method](#), [FilterDescriptor](#), [Parameter](#), [TypeDescriptor](#), [Association](#), [IndividuallySecurableMetadataObject](#), [MethodInstance](#), [AssociationGroup](#), [Action](#), [ActionParameter](#)

A simple type used to restrict the length of MetadataObject names.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="NameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
```

2.2.5.3 TypeNameString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Property](#)

A simple type used to specify data types. The value MUST be in the format specified by the following ABNF.

```
Identifier = TypeName (%x2C FullAssemblyName)
FullAssemblyName = LibraryIdentifier %x2C VersionProperty %x2C CultureProperty %x2C
PublicKeyTokenProperty
```

Where LibraryIdentifier, VersionProperty, PublicKeyTokenProperty, and CultureProperty are as specified in [\[MS-NRTP\]](#) section 2.2.1.3.

TypeName: The name of the type that conforms to the [\[ECMA-335\]](#) specification and can be understood by the .NET Framework. The format is as specified in [\[MS-NRTP\]](#) section 2.2.1.2.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="TypeNameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
```

2.2.5.4 VersionString

Target namespace: <http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources>

Referenced by: [Entity](#)

A set of 4 numeric values separated by dots that represent the version of the parent element.

The first numerical value represents the major version, the second numerical value represents the minor version, the third numerical value represents the build version and the forth numerical value represents the revision version.

The following W3C XML Schema ([\[XMLSCHEMA1\]](#) section 2.1) fragment specifies the contents of this simple type.

```
<xs:simpleType name="VersionString">
  <xs:restriction base="xs:string">
    <xs:pattern value="[0-9]+(\.[0-9]+){1,3}" />
  </xs:restriction>
</xs:simpleType>
```

3 Structure Examples

All the examples are using a simple model, describing hypothetical simplified Customer Relationship Management (CRM) system.

The examples in section [3.1](#), section [3.2](#) and section [3.3](#) are demonstrating the differences between equivalent Models targeting different LobSystem types (Database, DotNetAssembly and Web Service). To make the comparison easier they only describe a single Entity "Customer" with a single Method, used as a SpecificFinder.

The example in section [3.4](#) demonstrates the restricted schema used to set **Rights**, Properties and localized names for metadata object. This resources file can be used to extend any of the previous model examples.

The example in section [3.5](#) demonstrates Finders, Filters and DefaultValues.

The example in section [3.6](#) demonstrates Creator, Updater and Deleter MethodInstances.

The example in section [3.7](#) demonstrates Association between two Entities.

3.1 Database Model

This is an example of a simple model of an LOB system of type Database. It demonstrates how to use a set of LobSystem and LobSystemInstance properties to configure connection to a database.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <LobSystems>
    <LobSystem Name="ExampleCRM" Type="Database">
      <Properties>
        <!-- This database uses % symbol for the LIKE operator. -->
        <Property Name="WildcardCharacter" Type="System.String">%</Property>
      </Properties>
      <LobSystemInstances>
        <LobSystemInstance Name="ExampleServer">
          <Properties>
            <Property Name="AuthenticationMode" Type="System.String">PassThrough</Property>
            <!-- The database instance is named ExampleSQL and is running on the same
computer as the application using this Model. -->
            <Property Name="RdbConnection Data Source"
Type="System.String">(local)\ExampleSQL</Property>
            <!-- The database to be used is named ExampleDB. -->
            <Property Name="RdbConnection Initial Catalog"
Type="System.String">ExampleDB</Property>
            <!-- The database instance is using integrated security. -->
            <Property Name="RdbConnection Integrated Security"
Type="System.String">SSPI</Property>
          </Properties>
        </LobSystemInstance>
      </LobSystemInstances>
    </LobSystem>
  </LobSystems>
  <Entities>
    <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
      <Identifiers>
        <Identifier Name="CustomerIdentifier" TypeName="System.Int32" />
      </Identifiers>
      <Methods>
```



```

        <Method Name="GetCustomer">
            <Properties>
                <!-- sp_GetCustomer is the name of the stored procedure that implements this
method. -->
                <Property Name="RdbCommandText"
Type="System.String">sp_GetCustomer</Property>
                <!-- Using stored procedures is a best practice when connecting to database
systems. -->
                <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
            </Properties>
            <Parameters>
                <!-- The parameter name @CustomerId as expected by the stored procedure. -->
                <Parameter Name="@CustomerId" Direction="In">
                    <!-- The IdentifierName attribute is required here. -->
                    <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdIdentifier" />
                </Parameter>
                <Parameter Name="Customers" Direction="Return">
                    <!-- This SQL command returns a result set containing precisely one row, but
it is still wrapped by a data reader and appears as a collection. -->
                    <TypeDescriptor Name="CustomerDataReader"
TypeName="System.Data.SqlClient.SqlDataReader, System.Data, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089" IsCollection="true">
                        <TypeDescriptors>
                            <!-- This is a data record corresponding to a single row of the result
set. -->
                            <TypeDescriptor Name="Customer" TypeName="System.Data.IDataRecord,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">
                                <TypeDescriptors>
                                    <!-- The IdentifierName attribute is required here to associate the
field with the Identifier. -->
                                    <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdIdentifier" />
                                    <TypeDescriptor Name="FirstName" TypeName="System.String" />
                                    <TypeDescriptor Name="LastName" TypeName="System.String" />
                                </TypeDescriptors>
                            </TypeDescriptor>
                        </TypeDescriptors>
                    </Parameter>
                </Parameters>
                <MethodInstances>
                    <!-- The ReturnParameterName and ReturnPropertyDescriptor are pointing to the
data record to be returned. The result set that is wrapping it is not important and can be
ignored when processing results. -->
                    <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnPropertyDescriptorName="Customer" />
                </MethodInstances>
            </Method>
        </Methods>
    </Entity>
</Entities>
</LobSystem>
</LobSystems>
</Model>

```

3.2 DotNetAssembly Model

This is an example of a simple model of an LOB system of type DotNetAssembly. It demonstrates how to use the Class property to configure connection to the business logic module.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <LobSystems>
    <LobSystem Name="ExampleCRM" Type="DotNetAssembly">
      <LobSystemInstances>
        <LobSystemInstance Name="ExampleServer" />
      </LobSystemInstances>
      <Entities>
        <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
          <Properties>
            <Property Name="Class" Type="System.String">ExampleCrmNamespace.Customer,
ExampleCRM</Property>
          </Properties>
          <Identifiers>
            <Identifier Name="CustomerIdentifier" TypeName="System.Int32" />
          </Identifiers>
          <Methods>
            <Method Name="GetCustomers">
              <Parameters>
                <Parameter Name="CustomerId" Direction="In">
                  <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
                </Parameter>
                <Parameter Name="Customers" Direction="Return">
                  <TypeDescriptor Name="CustomerArray"
TypeName="ExampleCrmNamespace.Customer[], ExampleCRM" IsCollection="true">
                    <TypeDescriptors>
                      <TypeDescriptor Name="Customer" TypeName="ExampleCrmNamespace.Customer,
ExampleCRM">
                        <TypeDescriptors>
                          <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
                          <TypeDescriptor Name="FirstName" TypeName="System.String" />
                          <TypeDescriptor Name="LastName" TypeName="System.String" />
                        </TypeDescriptors>
                      </TypeDescriptor>
                    </TypeDescriptors>
                  </TypeDescriptor>
                </Parameter>
              </Parameters>
              <MethodInstances>
                <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnPropertyDescriptorName="Customer" />
              </MethodInstances>
            </Method>
          </Methods>
        </Entity>
      </Entities>
    </LobSystem>
  </LobSystems>
</Model>
```

3.3 Web Service Model

This is an example of a simple model of an LOB system of type Web Service. It demonstrates how to use a LobSystem of type "Wcf" and a set of LobSystem and LobSystemInstance properties to configure connection to a web service[<49>](#).

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <LobSystems>
    <LobSystem Name="ExampleCRM" Type="Wcf">
      <Properties>
        <Property Name="WcfMexDiscoMode" Type="System.String">Disco</Property>
        <Property Name="WcfMexDocumentUrl"
Type="System.String">http://example.org/?wsdl</Property>
        <Property Name="WcfProxyNamespace"
Type="System.String">ExampleCrmNamespace</Property>
        <Property Name="WsdlFetchAuthenticationMode"
Type="System.String">PassThrough</Property>
      </Properties>
      <LobSystemInstances>
        <LobSystemInstance Name="ExampleServer">
          <Properties>
            <Property Name="WcfAuthenticationMode"
Type="System.String">PassThrough</Property>
            <Property Name="WcfEndpointAddress"
Type="System.String">http://example.org</Property>
          </Properties>
        </LobSystemInstance>
      </LobSystemInstances>
      <Entities>
        <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
          <Identifiers>
            <Identifier Name="CustomerId" TypeName="System.Int32" />
          </Identifiers>
          <Methods>
            <Method Name="GetCustomers">
              <Parameters>
                <Parameter Name="CustomerId" Direction="In">
                  <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerId" />
                </Parameter>
                <Parameter Name="Customers" Direction="Return">
                  <TypeDescriptor Name="CustomerArray"
TypeName="ExampleCrmNamespace.Customer[], ExampleCRM" IsCollection="true">
                    <TypeDescriptors>
                      <TypeDescriptor Name="Customer" TypeName="ExampleCrmNamespace.Customer,
ExampleCRM">
                        <TypeDescriptors>
                          <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerId" />
                          <TypeDescriptor Name="FirstName" TypeName="System.String" />
                          <TypeDescriptor Name="LastName" TypeName="System.String" />
                        </TypeDescriptors>
                      </TypeDescriptor>
                    </TypeDescriptors>
                  </TypeDescriptor>
                </Parameter>
              </Parameters>
            </Method>
          </Methods>
        </Entity>
      </Entities>
    </LobSystem>
  </LobSystems>
</Model>
```

```

        <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnPropertyDescriptorName="Customer" />
    </MethodInstances>
</Method>
</Methods>
</Entity>
</Entities>
</LobSystem>
</LobSystems>
</Model>

```

3.4 Model Resources

This is an example of model resource file. It can be used to extend any of the previous sample model files with permissions and localized names.

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <AccessControlList>
    <AccessControlEntry Principal="NT AUTHORITY\Authenticated Users">
      <Right BdcRight="Edit" />
      <Right BdcRight="Execute" />
      <Right BdcRight="SetPermissions" />
      <Right BdcRight="SelectableInClients" />
    </AccessControlEntry>
  </AccessControlList>
  <LobSystems>
    <LobSystem Name="ExampleCRM">
      <AccessControlList>
        <AccessControlEntry Principal="NT AUTHORITY\Authenticated Users">
          <Right BdcRight="Edit" />
          <Right BdcRight="Execute" />
          <Right BdcRight="SetPermissions" />
          <Right BdcRight="SelectableInClients" />
        </AccessControlEntry>
      </AccessControlList>
      <Entities>
        <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
          <LocalizedDisplayNames>
            <LocalizedDisplayName LCID="2058">Cliente</LocalizedDisplayName>
            <LocalizedDisplayName LCID="1033">Customer</LocalizedDisplayName>
          </LocalizedDisplayNames>
          <AccessControlList>
            <AccessControlEntry Principal="NT AUTHORITY\Authenticated Users">
              <Right BdcRight="Edit" />
              <Right BdcRight="Execute" />
              <Right BdcRight="SetPermissions" />
              <Right BdcRight="SelectableInClients" />
            </AccessControlEntry>
          </AccessControlList>
          <Methods>
            <Method Name="GetCustomers">
              <MethodInstances>
                <MethodInstance Name="GetCustomer">
                  <AccessControlList>
                    <AccessControlEntry Principal="NT AUTHORITY\Authenticated Users">

```

```

        <Right BdcRight="Execute" />
        <Right BdcRight="Edit" />
        <Right BdcRight="SetPermissions" />
        <Right BdcRight="SelectableInClients" />
    </AccessControlEntry>
</AccessControlList>
</MethodInstance>
</MethodInstances>
</Method>
</Methods>
</Entity>
</Entities>
</LobSystem>
</LobSystems>
</Model>

```

3.5 Finders

This is an example of a model of an LOB system of type Database that uses filters to restrict the number of entity instances returned by a finder. It demonstrates how to associate filters to method parameters, how to reuse the same method for multiple method instances and how to annotate type descriptors with commonly used properties.

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <LobSystems>
    <LobSystem Name="ExampleCRM" Type="Database">
      <Properties>
        <Property Name="WildcardCharacter" Type="System.String">%</Property>
      </Properties>
      <LobSystemInstances>
        <LobSystemInstance Name="ExampleServer">
          <Properties>
            <Property Name="AuthenticationMode" Type="System.String">PassThrough</Property>
            <Property Name="RdbConnection Data Source"
Type="System.String">(local)\ExampleSQL</Property>
            <Property Name="RdbConnection Initial Catalog"
Type="System.String">ExampleDB</Property>
            <Property Name="RdbConnection Integrated Security"
Type="System.String">SSPI</Property>
          </Properties>
        </LobSystemInstance>
      </LobSystemInstances>
      <Entities>
        <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
          <Identifiers>
            <Identifier Name="CustomerIdentifier" TypeName="System.Int32" />
          </Identifiers>
          <Methods>
            <Method Name="GetCustomers">
              <Properties>
                <Property Name="RdbCommandType"
Type="System.Data.CommandType">Text</Property>
                <Property Name="RdbCommandText" Type="System.String">
                  <![CDATA[
                    SET ROWCOUNT @MaxCustomers;

```

```

        IF @CustomerIdentifier = '0'
            SELECT ID, FirstName, LastName, StreetAddress, City, ZipCode, Telephone,
LastChanged FROM Customers
        ELSE
            SELECT ID, FirstName, LastName, StreetAddress, City, ZipCode, Telephone,
LastChanged FROM Customers WHERE ID = @CustomerId;
        SET ROWCOUNT 0
    ]]>
</Property>
</Properties>
<FilterDescriptors>
    <FilterDescriptor Name="CustomerIdentifierFilter" Type="Comparison" />
    <FilterDescriptor Name="MaxCustomers" Type="Limit" />
</FilterDescriptors>
<Parameters>
    <Parameter Name="@CustomerId" Direction="In">
        <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" AssociatedFilter="CustomerIdentifierFilter">
            <DefaultValues>
                <DefaultValue MethodInstanceName="GetCustomers"
Type="System.Int32">0</DefaultValue>
            </DefaultValues>
        </TypeDescriptor>
    </Parameter>
    <Parameter Name="MaxCustomers" Direction="In">
        <TypeDescriptor Name="MaxCustomers" TypeName="System.Int32"
AssociatedFilter="MaxCustomers">
            <DefaultValues>
                <DefaultValue MethodInstanceName="GetCustomers"
Type="System.Int32">100</DefaultValue>
            </DefaultValues>
        </TypeDescriptor>
    </Parameter>
    <Parameter Name="Customers" Direction="Return">
        <TypeDescriptor Name="CustomerDataReader"
TypeName="System.Data.SqlClient.SqlDataReader, System.Data, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089" IsCollection="true">
            <TypeDescriptors>
                <TypeDescriptor Name="Customer" TypeName="System.Data.IDataRecord,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">
                    <TypeDescriptors>
                        <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
                        <TypeDescriptor Name="FirstName" TypeName="System.String">
                            <Properties>
                                <Property Name="ShowInPicker"
Type="System.Boolean">true</Property>
                                <Property Name="Size" Type="System.Int32">128</Property>
                            </Properties>
                        </TypeDescriptor>
                        <TypeDescriptor Name="LastName" TypeName="System.String">
                            <Properties>
                                <Property Name="ShowInPicker"
Type="System.Boolean">true</Property>
                                <Property Name="Size" Type="System.Int32">60</Property>
                            </Properties>
                        </TypeDescriptor>
                        <TypeDescriptor Name="StreetAddress" TypeName="System.String">
                            <Properties>
                                <Property Name="Size" Type="System.Int32">128</Property>

```

```

        </Properties>
    </TypeDescriptor>
    <TypeDescriptor Name="City" TypeName="System.String">
        <Properties>
            <Property Name="Size" Type="System.Int32">128</Property>
        </Properties>
    </TypeDescriptor>
    <TypeDescriptor Name="ZipCode" TypeName="System.String">
        <Properties>
            <Property Name="Size" Type="System.Int32">128</Property>
        </Properties>
    </TypeDescriptor>
    <TypeDescriptor Name="Telephone" TypeName="System.String">
        <Properties>
            <Property Name="HideInListWebPartByDefault"
Type="System.Boolean">true</Property>
            <Property Name="HideInItemWebPartByDefault"
Type="System.Boolean">true</Property>
            <Property Name="Size" Type="System.Int32">128</Property>
        </Properties>
    </TypeDescriptor>
    <TypeDescriptor Name="LastChanged" TypeName="System.DateTime">
        <Properties>
            <Property Name="HideInListWebPartByDefault"
Type="System.Boolean">true</Property>
            <Property Name="HideInItemWebPartByDefault"
Type="System.Boolean">true</Property>
        </Properties>
        <Interpretation>
            <NormalizeDateTime LobDateTimeMode="UTC" />
        </Interpretation>
    </TypeDescriptor>
</TypeDescriptors>
</TypeDescriptor>
</TypeDescriptors>
</TypeDescriptor>
</Parameter>
</Parameters>
<MethodInstances>
    <MethodInstance Name="GetCustomers" Type="Finder"
ReturnParameterName="Customers" />
    <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnPropertyDescriptorName="Customer" />
</MethodInstances>
</Method>
</Methods>
</Entity>
</Entities>
</LobSystem>
</LobSystems>
</Model>

```

3.6 CRUD

This is an example of a model of an LOB system of type Database. It demonstrates how to describe a full set of CRUD stereotypes for an entity.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
```

```

<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <LobSystems>
    <LobSystem Name="ExampleCRM" Type="Database">
      <Properties>
        <Property Name="WildcardCharacter" Type="System.String">%</Property>
      </Properties>
      <LobSystemInstances>
        <LobSystemInstance Name="ExampleServer">
          <Properties>
            <Property Name="AuthenticationMode" Type="System.String">PassThrough</Property>
            <Property Name="RdbConnection Data Source"
Type="System.String">(local)\ExampleSQL</Property>
            <Property Name="RdbConnection Initial Catalog"
Type="System.String">ExampleDB</Property>
            <Property Name="RdbConnection Integrated Security"
Type="System.String">SSPI</Property>
          </Properties>
        </LobSystemInstance>
      </LobSystemInstances>
    <Entities>
      <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
        <Identifiers>
          <Identifier Name="CustomerIdentifier" TypeName="System.Int32" />
        </Identifiers>
        <Methods>
          <Method Name="GetCustomers">
            <Properties>
              <Property Name="RdbCommandText"
Type="System.String">sp_GetCustomers</Property>
              <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
            </Properties>
            <Parameters>
              <Parameter Name="@CustomerId" Direction="In">
                <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
              </Parameter>
              <Parameter Name="Customers" Direction="Return">
                <TypeDescriptor Name="CustomerDataReader"
TypeName="System.Data.SqlClient.SqlDataReader, System.Data, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089" IsCollection="true">
                  <TypeDescriptors>
                    <TypeDescriptor Name="Customer" TypeName="System.Data.IDataRecord,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">
                      <TypeDescriptors>
                        <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
                        <TypeDescriptor Name="FirstName" TypeName="System.String" />
                        <TypeDescriptor Name="LastName" TypeName="System.String" />
                        <TypeDescriptor Name="StreetAddress" TypeName="System.String" />
                        <TypeDescriptor Name="City" TypeName="System.String" />
                        <TypeDescriptor Name="ZipCode" TypeName="System.String" />
                        <TypeDescriptor Name="Telephone" TypeName="System.String" />
                        <TypeDescriptor Name="LastChanged" TypeName="System.DateTime" />
                      </TypeDescriptors>
                    </TypeDescriptor>
                  </TypeDescriptors>
                </TypeDescriptor>
              </Parameter>

```



```

        </Parameters>
        <MethodInstances>
            <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnTypeDescriptorName="Customer" />
        </MethodInstances>
    </Method>
    <Method Name="CreateCustomer">
        <Properties>
            <Property Name="RdbCommandText"
Type="System.String">sp_CreateCustomer</Property>
            <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
        </Properties>
        <Parameters>
            <Parameter Name="@FirstName" Direction="In">
                <TypeDescriptor Name="FirstName" TypeName="System.String"
CreatorField="true" />
            </Parameter>
            <Parameter Name="@LastName" Direction="In">
                <TypeDescriptor Name="LastName" TypeName="System.String"
CreatorField="true" />
            </Parameter>
            <Parameter Name="@StreetAddress" Direction="In">
                <TypeDescriptor TypeName="System.String" Name="StreetAddress"
CreatorField="true" />
            </Parameter>
            <Parameter Name="@City" Direction="In">
                <TypeDescriptor TypeName="System.String" Name="City" CreatorField="true" />
            </Parameter>
            <Parameter Name="@ZipCode" Direction="In">
                <TypeDescriptor TypeName="System.String" Name="ZipCode" CreatorField="true"
/>
            </Parameter>
            <Parameter Name="@Telephone" Direction="In">
                <TypeDescriptor TypeName="System.String" Name="Telephone"
CreatorField="true" />
            </Parameter>
            <Parameter Name="Customer" Direction="Return">
                <TypeDescriptor Name="CustomerDataReader"
TypeName="System.Data.SqlClient.SqlDataReader, System.Data, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089">
                    <TypeDescriptors>
                        <TypeDescriptor Name="Customer" TypeName="System.Data.IDataRecord,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">
                            <TypeDescriptors>
                                <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
                            </TypeDescriptors>
                        </TypeDescriptor>
                    </TypeDescriptors>
                </TypeDescriptor>
            </Parameter>
        </Parameters>
        <MethodInstances>
            <MethodInstance Name="CreateCustomer" Type="Creator"
ReturnParameterName="Customer" />
        </MethodInstances>
    </Method>
    <Method Name="UpdateCustomer">
        <Properties>

```

```

        <Property Name="RdbCommandText"
Type="System.String">sp_UpdateCustomer</Property>
        <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
    </Properties>
    <Parameters>
        <Parameter Name="@CustomerId" Direction="In">
            <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerId" UpdaterField="true" />
        </Parameter>
        <Parameter Name="@FirstName" Direction="In">
            <TypeDescriptor Name="FirstName" TypeName="System.String"
UpdaterField="true" />
        </Parameter>
        <Parameter Name="@LastName" Direction="In">
            <TypeDescriptor Name="LastName" TypeName="System.String"
UpdaterField="true" />
        </Parameter>
        <Parameter Name="@StreetAddress" Direction="In">
            <TypeDescriptor Name="StreetAddress" TypeName="System.String"
UpdaterField="true" />
        </Parameter>
        <Parameter Name="@City" Direction="In">
            <TypeDescriptor Name="City" TypeName="System.String" UpdaterField="true" />
        </Parameter>
        <Parameter Name="@ZipCode" Direction="In">
            <TypeDescriptor Name="ZipCode" TypeName="System.String" UpdaterField="true"
/>
        </Parameter>
        <Parameter Name="@Telephone" Direction="In">
            <TypeDescriptor Name="Telephone" TypeName="System.String"
UpdaterField="true" />
        </Parameter>
    </Parameters>
    <MethodInstances>
        <MethodInstance Name="UpdateCustomer" Type="Updater" />
    </MethodInstances>
</Method>
<Method Name="DeleteCustomer">
    <Properties>
        <Property Name="RdbCommandText"
Type="System.String">sp_UpdateCustomer</Property>
        <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
    </Properties>
    <Parameters>
        <Parameter Name="@CustomerId" Direction="In">
            <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerId" />
        </Parameter>
    </Parameters>
    <MethodInstances>
        <MethodInstance Name="DeleteCustomer" Type="Deleter" />
    </MethodInstances>
</Method>
</Methods>
</Entity>
</Entities>
</LobSystem>
</LobSystems>

```

</Model>

3.7 Associations

This is an example of a model of an LOB system of type Database. It demonstrates how to describe a relationship between two entities within the same LobSystem.

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Model Name="ExampleApplicationDefinition"
xmlns="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog">
  <LobSystems>
    <LobSystem Name="ExampleCRM" Type="Database">
      <Properties>
        <Property Name="WildcardCharacter" Type="System.String">%</Property>
      </Properties>
      <LobSystemInstances>
        <LobSystemInstance Name="ExampleServer">
          <Properties>
            <Property Name="AuthenticationMode" Type="System.String">PassThrough</Property>
            <Property Name="RdbConnection Data Source"
Type="System.String">(local)\ExampleSQL</Property>
            <Property Name="RdbConnection Initial Catalog"
Type="System.String">ExampleDB</Property>
            <Property Name="RdbConnection Integrated Security"
Type="System.String">SSPI</Property>
          </Properties>
        </LobSystemInstance>
      </LobSystemInstances>
    <Entities>
      <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
        <Identifiers>
          <Identifier Name="CustomerIdentifier" TypeName="System.Int32" />
        </Identifiers>
        <Methods>
          <Method Name="GetCustomers">
            <Properties>
              <Property Name="RdbCommandText"
Type="System.String">sp_GetCustomers</Property>
              <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
            </Properties>
            <Parameters>
              <Parameter Name="@CustomerId" Direction="In">
                <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
              </Parameter>
              <Parameter Name="Customers" Direction="Return">
                <TypeDescriptor Name="CustomerDataReader"
TypeName="System.Data.SqlClient.SqlDataReader, System.Data, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089" IsCollection="true">
                  <TypeDescriptors>
                    <TypeDescriptor Name="Customer" TypeName="System.Data.IDataRecord,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">
                      <TypeDescriptors>
                        <TypeDescriptor Name="Id" TypeName="System.Int32"
IdentifierName="CustomerIdentifier" />
                        <TypeDescriptor Name="FirstName" TypeName="System.String" />
                        <TypeDescriptor Name="LastName" TypeName="System.String" />

```

```

        </TypeDescriptors>
    </TypeDescriptor>
</TypeDescriptors>
</TypeDescriptor>
    </Parameter>
</Parameters>
    <MethodInstances>
        <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnPropertyDescriptorName="Customer" />
    </MethodInstances>
</Method>
</Methods>
</Entity>
<Entity Namespace="example.com" Name="Order" Version="1.0.0.0">
    <Identifiers>
        <Identifier Name="OrderIdentifier" TypeName="System.Int64" />
    </Identifiers>
    <Methods>
        <Method Name="GetOrders">
            <Properties>
                <Property Name="RdbCommandText" Type="System.String">sp_GetOrders</Property>
                <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>
            </Properties>
            <Parameters>
                <Parameter Name="@Id" Direction="In">
                    <PropertyDescriptor Name="Id" TypeName="System.Int64"
IdentifierName="OrderIdentifier" />
                </Parameter>
                <Parameter Name="Orders" Direction="Return">
                    <PropertyDescriptor Name="OrderDataReader" TypeName="System.Data.IDataReader,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089"
IsCollection="true">
                        <TypeDescriptors>
                            <PropertyDescriptor Name="Order" TypeName="System.Data.IDataRecord,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">
                                <TypeDescriptors>
                                    <PropertyDescriptor Name="Id" TypeName="System.Int64"
IdentifierName="OrderIdentifier" />
                                    <PropertyDescriptor Name="CustomerId" TypeName="System.Int32"
IdentifierEntityName="Customer" IdentifierEntityNamespace="example.com"
IdentifierName="CustomerId" ForeignIdentifierAssociationName="GetOrdersForCustomer"
/>
                                    <PropertyDescriptor Name="OrderDate" TypeName="System.DateTime" />
                                </TypeDescriptors>
                            </PropertyDescriptor>
                        </TypeDescriptors>
                    </Parameter>
                </Parameters>
                <MethodInstances>
                    <MethodInstance Name="GetOrder" Type="SpecificFinder"
ReturnParameterName="Orders" ReturnPropertyDescriptorName="Order" />
                </MethodInstances>
            </Method>
            <Method Name="GetOrdersForCustomer">
                <Properties>
                    <Property Name="RdbCommandText" Type="System.String">sp_GetOrders</Property>
                    <Property Name="RdbCommandType" Type="System.Data.CommandType, System.Data,
Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089">StoredProcedure</Property>

```

```

        </Properties>
        <Parameters>
            <Parameter Direction="In" Name="@CustomerIdentifier">
                <TypeDescriptor Name="@CustomerIdentifier" TypeName="System.Int32"
IdentifierEntityName="Customer" IdentifierEntityNamespace="example.com"
IdentifierName="CustomerIdentifier" ForeignIdentifierAssociationName="GetOrdersForCustomer"
/>
            </Parameter>
            <Parameter Name="Orders" Direction="Return">
                <TypeDescriptor Name="OrderDataReader" TypeName="System.Data.IDataReader,
System.Data, Version=2.0.0.0, Culture=neutral, PublicKeyToken=b77a5c561934e089"
IsCollection="true">
                    <TypeDescriptors>
                        <TypeDescriptor Name="OrderDataRecord"
TypeName="System.Data.IDataRecord, System.Data, Version=2.0.0.0, Culture=neutral,
PublicKeyToken=b77a5c561934e089">
                            <TypeDescriptors>
                                <TypeDescriptor Name="Id" TypeName="System.Int64"
IdentifierName="OrderIdentifier" />
                                <TypeDescriptor Name="CustomerId" TypeName="System.Int32"
IdentifierEntityName="Customer" IdentifierEntityNamespace="example.com"
IdentifierName="CustomerIdentifier" ForeignIdentifierAssociationName="GetOrdersForCustomer"
/>
                                <TypeDescriptor Name="OrderDate" TypeName="System.DateTime" />
                            </TypeDescriptors>
                        </TypeDescriptor>
                    </TypeDescriptors>
                </TypeDescriptor>
            </Parameter>
        </Parameters>
        <MethodInstances>
            <Association Name="GetOrdersForCustomer" Type="AssociationNavigator"
ReturnParameterName="Orders">
                <SourceEntity Name="Customer" Namespace="example.com" />
                <DestinationEntity Name="Order" Namespace="example.com" />
            </Association>
        </MethodInstances>
    </Method>
</Methods>
</Entity>
</Entities>
</LobSystem>
</LobSystems>
</Model>

```

4 Security Considerations

The **proxy** attribute of the [LobSystem](#) element contain the binary representation of a Business Logic Module. When loading modules, verification is recommended to ensure the module origin is trusted.

5 Appendix A: Full XML Schemas

For ease of implementation, this section provides the full **XML schemas** for the Business Data Connectivity Model File Format and the Business Data Connectivity Model Resource File Format, as specified in section 2.

5.1 Business Data Connectivity Model Structure XSD

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:bdc="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog"
  targetNamespace="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog"
  elementFormDefault="qualified">
  <xs:element name="Model" type="bdc:Model"/>
  <xs:complexType name="Model">
    <xs:complexContent>
      <xs:extension base="bdc:IndividuallySecurableMetadataObject">
        <xs:sequence>
          <xs:element name="LobSystems" type="bdc:LobSystems" minOccurs="0" maxOccurs="1">
            <xs:unique name="LobSystemNameKey">
              <xs:selector xpath="*/>
              <xs:field xpath="@Name"/>
            </xs:unique>
          </xs:element>
        </xs:sequence>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="LobSystems">
    <xs:sequence>
      <xs:element name="LobSystem" type="bdc:LobSystem" minOccurs="1" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="MetadataObject" abstract="true">
    <xs:sequence>
      <xs:element name="LocalizedDisplayNames" type="bdc:LocalizedDisplayNames" minOccurs="0"
        maxOccurs="1">
        <xs:unique name="LocalizedDisplayNameLCIDKey">
          <xs:selector xpath="*/>
          <xs:field xpath="@LCID"/>
        </xs:unique>
      </xs:element>
      <xs:element name="Properties" type="bdc:Properties" minOccurs="0" maxOccurs="1">
        <xs:unique name="PropertyNameKey">
          <xs:selector xpath="*/>
          <xs:field xpath="@Name"/>
        </xs:unique>
      </xs:element>
    </xs:sequence>
    <xs:attribute name="Name" type="bdc:NameString" use="required"/>
    <xs:attribute name="DefaultDisplayName" type="bdc:NameString"/>
    <xs:attribute name="IsCached" type="xs:boolean" default="true"/>
  </xs:complexType>
  <xs:complexType name="IndividuallySecurableMetadataObject" abstract="true">
    <xs:complexContent>
      <xs:extension base="bdc:MetadataObject">
        <xs:sequence>
```

```

        <xs:element name="AccessControlList" type="bdc:AccessControlList" minOccurs="0"
maxOccurs="1"/>
    </xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="LocalizedDisplayNames">
    <xs:sequence>
        <xs:element name="LocalizedDisplayName" type="bdc:LocalizedDisplayName" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LocalizedDisplayName" mixed="true">
    <xs:attribute name="LCID" type="xs:integer" use="required"/>
</xs:complexType>
<xs:complexType name="LobSystem">
    <xs:complexContent>
        <xs:extension base="bdc:IndividuallySecurableMetadataObject">
            <xs:sequence>
                <xs:element name="Proxy" type="xs:string" minOccurs="0" maxOccurs="1"/>
                <xs:element name="LobSystemInstances" type="bdc:LobSystemInstances" minOccurs="0"
maxOccurs="1">
                    <xs:unique name="LobSystemInstanceNameKey">
                        <xs:selector xpath="*/>
                        <xs:field xpath="@Name"/>
                    </xs:unique>
                </xs:element>
                <xs:element name="Entities" type="bdc:Entities" minOccurs="0" maxOccurs="1">
                    <xs:unique name="EntityNameNamespaceVersionKey">
                        <xs:selector xpath="*/>
                        <xs:field xpath="@Name"/>
                        <xs:field xpath="@Namespace"/>
                        <xs:field xpath="@Version"/>
                    </xs:unique>
                </xs:element>
            </xs:sequence>
            <xs:attribute name="Type" type="bdc:LobSystemType" use="required"/>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>
<xs:simpleType name="LobSystemType">
    <xs:restriction base="xs:string">
        <xs:enumeration value="Database"/>
        <xs:enumeration value="DotNetAssembly"/>
        <xs:enumeration value="Wcf"/>
        <xs:enumeration value="WebService"/>
        <xs:enumeration value="Custom"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="LobSystemInstances">
    <xs:sequence>
        <xs:element name="LobSystemInstance" type="bdc:LobSystemInstance" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="LobSystemInstance">
    <xs:complexContent>
        <xs:extension base="bdc:MetadataObject"/>
    </xs:complexContent>

```



```

</xs:complexType>
<xs:complexType name="Entities">
  <xs:sequence>
    <xs:element name="Entity" type="bdc:Entity" minOccurs="1" maxOccurs="unbounded">
      <xs:unique name="MethodInstanceNameKey">
        <xs:selector xpath="//bdc:MethodInstances/*"/>
        <xs:field xpath="@Name"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Entity">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="Identifiers" type="bdc:Identifiers" minOccurs="0">
          <xs:unique name="IdentifierNameKey">
            <xs:selector xpath="*"/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Methods" type="bdc:Methods" minOccurs="0">
          <xs:unique name="MethodNameKey">
            <xs:selector xpath="*"/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="AssociationGroups" type="bdc:AssociationGroups" minOccurs="0">
          <xs:unique name="AssociationGroupNameKey">
            <xs:selector xpath="*"/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Actions" type="bdc:Actions" minOccurs="0">
          <xs:unique name="ActionNameKey">
            <xs:selector xpath="*"/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
      </xs:sequence>
      <xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
      <xs:attribute name="Version" type="bdc:VersionString" use="required"/>
      <xs:attribute name="EstimatedInstanceCount" type="bdc:InstanceCount"
default="10000"/>
      <xs:attribute name="DefaultOperationMode" type="bdc:OperationModeType"
default="Default" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:simpleType name="OperationModeType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Online"/>
    <xs:enumeration value="Cached"/>
    <xs:enumeration value="Offline"/>
    <xs:enumeration value="Default"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="AssociationGroups">
  <xs:sequence>

```

```

    <xs:element name="AssociationGroup" type="bdc:AssociationGroup" minOccurs="1"
maxOccurs="unbounded">
      <xs:unique name="AssociationReferenceAssociationNameEntityNameEntityNamespaceKey">
        <xs:selector xpath="*/>
        <xs:field xpath="@EntityNamespace"/>
        <xs:field xpath="@EntityName"/>
        <xs:field xpath="@AssociationName"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="AssociationGroup">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="AssociationReference" type="bdc:AssociationReference"
minOccurs="1" maxOccurs="unbounded" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="AssociationReference">
  <xs:attribute name="EntityNamespace" type="bdc:NameString" use="optional" />
  <xs:attribute name="EntityName" type="bdc:NameString" use="optional" />
  <xs:attribute name="AssociationName" type="bdc:NameString" use="required" />
  <xs:attribute name="Reverse" type="xs:boolean" use="optional" default="false" />
</xs:complexType>
<xs:complexType name="Identifiers">
  <xs:sequence>
    <xs:element name="Identifier" type="bdc:Identifier" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Identifier">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:attribute name="TypeName" type="bdc:IdentifierType" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:simpleType name="IdentifierType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="System.Boolean"/>
    <xs:enumeration value="System.Byte"/>
    <xs:enumeration value="System.Char"/>
    <xs:enumeration value="System.DateTime"/>
    <xs:enumeration value="System.Decimal"/>
    <xs:enumeration value="System.Double"/>
    <xs:enumeration value="System.Guid"/>
    <xs:enumeration value="System.Int16"/>
    <xs:enumeration value="System.Int32"/>
    <xs:enumeration value="System.Int64"/>
    <xs:enumeration value="System.SByte"/>
    <xs:enumeration value="System.Single"/>
    <xs:enumeration value="System.String"/>
    <xs:enumeration value="System.TimeSpan"/>
    <xs:enumeration value="System.UInt16"/>
    <xs:enumeration value="System.UInt32"/>
    <xs:enumeration value="System.UInt64"/>
  </xs:restriction>
</xs:simpleType>

```

```

    </xs:restriction>
  </xs:simpleType>
  <xs:complexType name="Methods">
    <xs:sequence>
      <xs:element name="Method" type="bdc:Method" minOccurs="1" maxOccurs="unbounded">
        <xs:key name="ParameterNameKey">
          <xs:selector xpath="."/bdc:Parameter"/>
          <xs:field xpath="@Name"/>
        </xs:key>
        <xs:keyref name="ParameterNameRef" refer="bdc:ParameterNameKey">
          <xs:selector xpath="."/bdc:MethodInstances/*"/>
          <xs:field xpath="@ReturnParameterName"/>
        </xs:keyref>
        <xs:key name="MethodMethodNameKey">
          <xs:selector xpath="."/bdc:MethodInstances/*"/>
          <xs:field xpath="@Name"/>
        </xs:key>
        <xs:keyref name="DefaultValueMethodNameRef"
refer="bdc:MethodMethodNameKey">
          <xs:selector xpath="."/bdc:DefaultValue"/>
          <xs:field xpath="@MethodName"/>
        </xs:keyref>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="Method">
    <xs:complexContent>
      <xs:extension base="bdc:IndividuallySecurableMetadataObject">
        <xs:sequence>
          <xs:element name="FilterDescriptors" type="bdc:FilterDescriptors" minOccurs="0"
maxOccurs="1">
            <xs:unique name="FilterDescriptorNameKey">
              <xs:selector xpath="*/>
              <xs:field xpath="@Name"/>
            </xs:unique>
          </xs:element>
          <xs:element name="Parameters" type="bdc:Parameters" minOccurs="0" maxOccurs="1"/>
          <xs:element name="MethodInstances" type="bdc:MethodInstances" minOccurs="0"
maxOccurs="1"/>
        </xs:sequence>
        <xs:attribute name="IsStatic" type="xs:boolean" default="true"/>
        <xs:attribute name="LobName" type="bdc:NameString" use="optional"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
  <xs:complexType name="FilterDescriptors">
    <xs:sequence>
      <xs:element name="FilterDescriptor" type="bdc:FilterDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="FilterDescriptor">
    <xs:complexContent>
      <xs:extension base="bdc:MetadataObject">
        <xs:attribute name="Type" type="bdc:FilterDescriptorType" use="required"/>
        <xs:attribute name="FilterField" type="bdc:NameString" use="optional" />
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

```

```

<xs:simpleType name="FilterDescriptorType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Limit"/>
    <xs:enumeration value="PageNumber"/>
    <xs:enumeration value="Wildcard"/>
    <xs:enumeration value="UserContext"/>
    <xs:enumeration value="UserCulture"/>
    <xs:enumeration value="Username"/>
    <xs:enumeration value="Password"/>
    <xs:enumeration value="LastId"/>
    <xs:enumeration value="SsoTicket"/>
    <xs:enumeration value="UserProfile"/>
    <xs:enumeration value="Comparison"/>
    <xs:enumeration value="Timestamp"/>
    <xs:enumeration value="Input"/>
    <xs:enumeration value="Output"/>
    <xs:enumeration value="InputOutput"/>
    <xs:enumeration value="Batching"/>
    <xs:enumeration value="BatchingTermination"/>
    <xs:enumeration value="ActivityId"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="MethodInstances">
  <xs:choice minOccurs="1" maxOccurs="unbounded">
    <xs:element name="Association" type="bdc:Association">
      <xs:unique name="SourceEntityNameNamespaceKey">
        <xs:selector xpath="bdc:SourceEntity"/>
        <xs:field xpath="@Name"/>
        <xs:field xpath="@Namespace"/>
      </xs:unique>
    </xs:element>
    <xs:element name="MethodInstance" type="bdc:MethodInstance" />
  </xs:choice>
</xs:complexType>
<xs:complexType name="MethodInstance">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:attribute name="Type" type="bdc:MethodInstanceType" use="required"/>
      <xs:attribute name="Default" type="xs:boolean" use="optional" default="false"/>
      <xs:attribute name="ReturnParameterName" type="bdc:NameString" use="optional"/>
      <xs:attribute name="ReturnTypeDescriptorName" type="bdc:NameString" use="optional"/>
      <xs:attribute name="ReturnTypeDescriptorLevel" type="bdc:ReturnTypeDescriptorLevel"
use="optional"/>
      <xs:attribute name="ReturnTypeDescriptorPath" type="bdc:TypeDescriptorPathString"
use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:simpleType name="TypeDescriptorPathString">
  <xs:restriction base="xs:string" />
</xs:simpleType>
<xs:simpleType name="MethodInstanceType">
  <xs:restriction base="xs:string">
    <xs:enumeration value="Finder"/>
    <xs:enumeration value="SpecificFinder"/>
    <xs:enumeration value="GenericInvoker"/>
    <xs:enumeration value="IdEnumerator"/>
    <xs:enumeration value="ChangedIdEnumerator"/>
    <xs:enumeration value="DeletedIdEnumerator"/>
  </xs:restriction>
</xs:simpleType>

```

```

<xs:enumeration value="Scalar"/>
<xs:enumeration value="AccessChecker"/>
<xs:enumeration value="AssociationNavigator" />
<xs:enumeration value="Associator" />
<xs:enumeration value="Disassociator" />
<xs:enumeration value="Creator"/>
<xs:enumeration value="Deleter"/>
<xs:enumeration value="Updater"/>
<xs:enumeration value="StreamAccessor"/>
<xs:enumeration value="BinarySecurityDescriptorAccessor"/>
<xs:enumeration value="BulkSpecificFinder"/>
<xs:enumeration value="BulkAssociatedIdEnumerator" />
<xs:enumeration value="BulkAssociationNavigator" />
<xs:enumeration value="BulkIdEnumerator"/>
</xs:restriction>
</xs:simpleType>
<xs:complexType name="Parameters">
  <xs:sequence>
    <xs:element name="Parameter" type="bdc:Parameter" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Parameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor"/>
      </xs:sequence>
        <xs:attribute name="Direction" type="bdc:ParameterDirection" use="required"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
<xs:simpleType name="ParameterDirection">
  <xs:restriction base="xs:string">
    <xs:enumeration value="In"/>
    <xs:enumeration value="Out"/>
    <xs:enumeration value="InOut"/>
    <xs:enumeration value="Return"/>
  </xs:restriction>
</xs:simpleType>
<xs:complexType name="TypeDescriptor">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="Interpretation" type="bdc:Interpretation" minOccurs="0"/>
        <xs:element name="DefaultValues" type="bdc:DefaultValues" minOccurs="0">
          <xs:unique name="DefaultValueMethodInstanceNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@MethodInstanceName"/>
          </xs:unique>
        </xs:element>
        <xs:element name="TypeDescriptors" type="bdc:TypeDescriptors" minOccurs="0">
          <xs:unique name="TypeDescriptorNameKey">
            <xs:selector xpath="*/>
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
      </xs:sequence>
        <xs:attribute name="TypeName" type="bdc:TypeDescriptorTypeNameString"
use="required"/>

```

```

        <xs:attribute name="lobName" type="bdc:NameString" use="optional"/>
        <xs:attribute name="IdentifierEntityNamespace" type="bdc:NameString" use="optional"/>
        <xs:attribute name="IdentifierEntityName" type="bdc:NameString" use="optional"/>
        <xs:attribute name="IdentifierName" type="bdc:NameString" use="optional"/>
        <xs:attribute name="ForeignIdentifierAssociationName" type="bdc:NameString"
use="optional"/>
        <xs:attribute name="ForeignIdentifierAssociationEntityName" type="bdc:NameString"
use="optional"/>
        <xs:attribute name="ForeignIdentifierAssociationEntityNamespace"
type="bdc:NameString" use="optional"/>
        <xs:attribute name="AssociatedFilter" type="bdc:NameString" use="optional"/>
        <xs:attribute name="IsCollection" type="xs:boolean" default="false" use="optional"/>
        <xs:attribute name="ReadOnly" type="xs:boolean" default="false" use="optional"/>
        <xs:attribute name="CreatorField" type="xs:boolean" default="false" use="optional"/>
        <xs:attribute name="UpdaterField" type="xs:boolean" default="false" use="optional"/>
        <xs:attribute name="PreUpdaterField" type="xs:boolean" default="false"
use="optional"/>
        <xs:attribute name="Significant" type="xs:boolean" default="true" use="optional"/>
    </xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="DefaultValues">
    <xs:sequence>
        <xs:element name="DefaultValue" type="bdc:DefaultValue" minOccurs="1"
maxOccurs="unbounded" nillable="true"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="DefaultValue" mixed="true">
    <xs:attribute name="MethodInstanceName" type="bdc:NameString" use="required"/>
    <xs:attribute name="Type" type="bdc:TypeDescriptorTypeNameString" use="required"/>
</xs:complexType>
<xs:complexType name="Interpretation">
    <xs:choice minOccurs="1" maxOccurs="unbounded">
        <xs:element name="ConvertType" type="bdc:ConvertType" />
        <xs:element name="NormalizeDateTime" type="bdc:NormalizeDateTime" />
        <xs:element name="NormalizeString" type="bdc:NormalizeString" />
    </xs:choice>
</xs:complexType>

<xs:complexType name="ConvertType">
    <xs:attribute name="LOBType" type="bdc:TypeNameString" use="required" />
    <xs:attribute name="BDCType" type="bdc:TypeNameString" use="required" />
    <xs:attribute name="LOBLocale" type="bdc:TypeNameString" use="optional" />
</xs:complexType>

<xs:simpleType name="StringNormalizeMode">
    <xs:restriction base="xs:string">
        <xs:enumeration value="NoChange" />
        <xs:enumeration value="NormalizeToEmptyString" />
        <xs:enumeration value="NormalizeToNull" />
    </xs:restriction>
</xs:simpleType>

<xs:complexType name="NormalizeString">
    <xs:attribute name="FromLOB" type="bdc:StringNormalizeMode" use="required" />
    <xs:attribute name="ToLOB" type="bdc:StringNormalizeMode" use="required" />
</xs:complexType>

<xs:simpleType name="LobDateTimeMode">

```

```

    <xs:restriction base="xs:string">
      <xs:enumeration value="UTC" />
      <xs:enumeration value="Local" />
      <xs:enumeration value="Unspecified" />
    </xs:restriction>
  </xs:simpleType>

  <xs:complexType name="NormalizeDateTime">
    <xs:attribute name="LobDateTimeMode" type="bdc:LobDateTimeMode" use="required" />
  </xs:complexType>

  <xs:complexType name="TypeDescriptors">
    <xs:sequence>
      <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="Actions">
    <xs:sequence>
      <xs:element name="Action" type="bdc:Action" minOccurs="1" maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="Action">
    <xs:complexContent>
      <xs:extension base="bdc:MetadataObject">
        <xs:sequence>
          <xs:element name="ActionParameters" type="bdc:ActionParameters" minOccurs="0">
            <xs:unique name="ActionParameterNameKey">
              <xs:selector xpath="*/>
              <xs:field xpath="@Name"/>
            </xs:unique>
            <xs:unique name="ActionParameterIndexKey">
              <xs:selector xpath="*/>
              <xs:field xpath="@Index"/>
            </xs:unique>
          </xs:element>
        </xs:sequence>
        <xs:attribute name="Position" type="bdc:ActionPosition" use="required"/>
        <xs:attribute name="IsOpenedInNewWindow" type="xs:boolean" default="false"/>
        <xs:attribute name="Url" type="bdc:UrlString" use="required"/>
        <xs:attribute name="ImageUrl" type="bdc:UrlString"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="ActionParameters">
    <xs:sequence>
      <xs:element name="ActionParameter" type="bdc:ActionParameter" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>

  <xs:complexType name="ActionParameter">
    <xs:complexContent>
      <xs:extension base="bdc:MetadataObject">
        <xs:attribute name="Index" type="bdc:Ordinal" use="required"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>

  <xs:complexType name="Association">
    <xs:complexContent>

```

```

        <xs:extension base="bdc:MethodInstance">
            <xs:sequence>
                <xs:element name="SourceEntity" type="bdc:SourceEntity" minOccurs="1"
maxOccurs="unbounded"/>
                <xs:element name="DestinationEntity" type="bdc:DestinationEntity" minOccurs="1"
maxOccurs="1"/>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>
<xs:complexType name="SourceEntity">
    <xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
    <xs:attribute name="Name" type="bdc:NameString" use="required"/>
</xs:complexType>
<xs:complexType name="DestinationEntity">
    <xs:attribute name="Namespace" type="bdc:NameString" use="required"/>
    <xs:attribute name="Name" type="bdc:NameString" use="required"/>
</xs:complexType>
<xs:complexType name="Property" mixed="true">
    <xs:attribute name="Name" type="bdc:NameString" use="required"/>
    <xs:attribute name="Type" type="bdc:TypeNameString" use="required"/>
</xs:complexType>
<xs:complexType name="Properties">
    <xs:sequence>
        <xs:element name="Property" type="bdc:Property" minOccurs="1" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:simpleType name="Ordinal">
    <xs:restriction base="xs:integer">
        <xs:minInclusive value="0"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="InstanceCount">
    <xs:restriction base="xs:integer">
        <xs:minInclusive value="0"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="ReturnTypeDescriptorLevel">
    <xs:restriction base="xs:integer">
        <xs:minInclusive value="0"/>
        <xs:maxInclusive value="29"/>
    </xs:restriction>
</xs:simpleType>
<xs:simpleType name="ActionPosition">
    <xs:restriction base="xs:integer">
        <xs:minInclusive value="1"/>
    </xs:restriction>
</xs:simpleType>
<xs:complexType name="AccessControlList">
    <xs:sequence>
        <xs:element name="AccessControlEntry" type="bdc:AccessControlEntry" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AccessControlEntry">
    <xs:sequence>
        <xs:element name="Right" type="bdc:Right" minOccurs="1" maxOccurs="unbounded"/>
    </xs:sequence>
    <xs:attribute name="Principal" type="xs:string" use="required"/>

```



```

</xs:complexType>
<xs:complexType name="Right">
  <xs:attribute name="BdcRight" type="bdc:BdcRightName" use="required"/>
</xs:complexType>
<xs:simpleType name="BdcRightName">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None"/>
    <xs:enumeration value="Execute"/>
    <xs:enumeration value="Edit"/>
    <xs:enumeration value="SetPermissions"/>
    <xs:enumeration value="SelectableInClients"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="NameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TypeDescriptorTypeNameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TypeNameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="UrlString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="2080"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="VersionString">
  <xs:restriction base="xs:string">
    <xs:pattern value="[0-9]+(\.[0-9]+){1,3}"/>
  </xs:restriction>
</xs:simpleType>
</xs:schema>

```

5.2 Business Data Connectivity Model Resource Structure XSD

```

<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
  xmlns:bdc="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources" targetNameSpace="http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources"
  elementFormDefault="qualified">
  <xs:element name="Model" type="bdc:Model"/>
  <xs:complexType name="Model">
    <xs:complexContent>
      <xs:extension base="bdc:IndividuallySecurableMetadataObject">
        <xs:sequence>
          <xs:element name="LobSystems" type="bdc:LobSystems" minOccurs="0" maxOccurs="1">
            <xs:unique name="LobSystemNameKey">

```

```

        <xs:selector xpath="*" />
        <xs:field xpath="@Name" />
      </xs:unique>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="Name" type="bdc:NameString" use="required" />
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="LobSystems">
  <xs:sequence>
    <xs:element name="LobSystem" type="bdc:LobSystem" minOccurs="1" maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
<xs:complexType name="MetadataObject" abstract="true">
  <xs:sequence>
    <xs:element name="LocalizedDisplayNames" type="bdc:LocalizedDisplayNames" minOccurs="0"
maxOccurs="1">
      <xs:unique name="LocalizedDisplayNameLCIDKey">
        <xs:selector xpath="*" />
        <xs:field xpath="@LCID" />
      </xs:unique>
    </xs:element>
    <xs:element name="Properties" type="bdc:Properties" minOccurs="0" maxOccurs="1">
      <xs:unique name="PropertyNameKey">
        <xs:selector xpath="*" />
        <xs:field xpath="@Name" />
      </xs:unique>
    </xs:element>
  </xs:sequence>
  <xs:attribute name="Name" type="bdc:NameString" use="required" />
</xs:complexType>
<xs:complexType name="IndividuallySecurableMetadataObject" abstract="true">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:sequence>
        <xs:element name="AccessControlList" type="bdc:AccessControlList" minOccurs="0"
maxOccurs="1" />
      </xs:sequence>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="LocalizedDisplayNames">
  <xs:sequence>
    <xs:element name="LocalizedDisplayName" type="bdc:LocalizedDisplayName" minOccurs="1"
maxOccurs="unbounded" />
  </xs:sequence>
</xs:complexType>
<xs:complexType name="LocalizedDisplayName" mixed="true">
  <xs:attribute name="LCID" type="xs:integer" use="required" />
</xs:complexType>
<xs:complexType name="LobSystem">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="LobSystemInstances" type="bdc:LobSystemInstances" minOccurs="0"
maxOccurs="1">
          <xs:unique name="LobSystemInstanceNameKey">
            <xs:selector xpath="*" />

```

```

        <xs:field xpath="@Name"/>
      </xs:unique>
    </xs:element>
  <xs:element name="Entities" type="bdc:Entities" minOccurs="0" maxOccurs="1">
    <xs:unique name="EntityNameNamespaceVersionKey">
      <xs:selector xpath="*" />
      <xs:field xpath="@Name"/>
      <xs:field xpath="@Namespace"/>
      <xs:field xpath="@Version"/>
    </xs:unique>
  </xs:element>
</xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="LobSystemInstances">
  <xs:sequence>
    <xs:element name="LobSystemInstance" type="bdc:LobSystemInstance" minOccurs="1"
maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="LobSystemInstance">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
<xs:complexType name="Entities">
  <xs:sequence>
    <xs:element name="Entity" type="bdc:Entity" minOccurs="1" maxOccurs="unbounded">
      <xs:unique name="MethodInstanceNameKey">
        <xs:selector xpath="./bdc:MethodInstances/*" />
        <xs:field xpath="@Name"/>
      </xs:unique>
    </xs:element>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="Entity">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject">
      <xs:sequence>
        <xs:element name="Identifiers" type="bdc:Identifiers" minOccurs="0">
          <xs:unique name="IdentifierNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Methods" type="bdc:Methods" minOccurs="0">
          <xs:unique name="MethodNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="AssociationGroups" type="bdc:AssociationGroups" minOccurs="0">
          <xs:unique name="AssociationGroupNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name"/>
          </xs:unique>
        </xs:element>
        <xs:element name="Actions" type="bdc:Actions" minOccurs="0">

```

```

        <xs:unique name="ActionNameKey">
            <xs:selector xpath="*" />
            <xs:field xpath="@Name" />
        </xs:unique>
    </xs:element>
</xs:sequence>
<xs:attribute name="Namespace" type="bdc:NameString" use="required" />
<xs:attribute name="Version" type="bdc:VersionString" use="required" />
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="AssociationGroups">
    <xs:sequence>
        <xs:element name="AssociationGroup" type="bdc:AssociationGroup" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="AssociationGroup">
    <xs:complexContent>
        <xs:extension base="bdc:MetadataObject" />
    </xs:complexContent>
</xs:complexType>
<xs:complexType name="Identifiers">
    <xs:sequence>
        <xs:element name="Identifier" type="bdc:Identifier" minOccurs="1"
maxOccurs="unbounded" />
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Identifier">
    <xs:complexContent>
        <xs:extension base="bdc:MetadataObject" />
    </xs:complexContent>
</xs:complexType>
<xs:complexType name="Methods">
    <xs:sequence>
        <xs:element name="Method" type="bdc:Method" minOccurs="1" maxOccurs="unbounded">
            <xs:key name="ParameterNameKey">
                <xs:selector xpath="."/ /bdc:Parameter" />
                <xs:field xpath="@Name" />
            </xs:key>
            <xs:key name="MethodMethodInstanceNameKey">
                <xs:selector xpath="."/ /bdc:MethodInstances/" />
                <xs:field xpath="@Name" />
            </xs:key>
        </xs:element>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Method">
    <xs:complexContent>
        <xs:extension base="bdc:IndividuallySecurableMetadataObject">
            <xs:sequence>
                <xs:element name="FilterDescriptors" type="bdc:FilterDescriptors" minOccurs="0"
maxOccurs="1">
                    <xs:unique name="FilterDescriptorNameKey">
                        <xs:selector xpath="*" />
                        <xs:field xpath="@Name" />
                    </xs:unique>
                </xs:element>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>

```

```

        <xs:element name="Parameters" type="bdc:Parameters" minOccurs="0" maxOccurs="1"/>
        <xs:element name="MethodInstances" type="bdc:MethodInstances" minOccurs="0"
maxOccurs="1"/>
    </xs:sequence>
</xs:extension>
</xs:complexContent>
</xs:complexType>
<xs:complexType name="FilterDescriptors">
    <xs:sequence>
        <xs:element name="FilterDescriptor" type="bdc:FilterDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="FilterDescriptor">
    <xs:complexContent>
        <xs:extension base="bdc:MetadataObject">
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>

<xs:complexType name="MethodInstances">
    <xs:choice minOccurs="1" maxOccurs="unbounded">
        <xs:element name="Association" type="bdc:Association" />
        <xs:element name="MethodInstance" type="bdc:MethodInstance" />
    </xs:choice>
</xs:complexType>

<xs:complexType name="MethodInstance">
    <xs:complexContent>
        <xs:extension base="bdc:IndividuallySecurableMetadataObject">
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
<xs:complexType name="Parameters">
    <xs:sequence>
        <xs:element name="Parameter" type="bdc:Parameter" minOccurs="1" maxOccurs="unbounded"/>
    </xs:sequence>
</xs:complexType>
<xs:complexType name="Parameter">
    <xs:complexContent>
        <xs:extension base="bdc:MetadataObject">
            <xs:sequence>
                <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor"/>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>
</xs:complexType>
<xs:complexType name="TypeDescriptor">
    <xs:complexContent>
        <xs:extension base="bdc:MetadataObject">
            <xs:sequence>
                <xs:element name="TypeDescriptors" type="bdc:TypeDescriptors" minOccurs="0">
                    <xs:unique name="TypeDescriptorNameKey">
                        <xs:selector xpath="*" />
                        <xs:field xpath="@Name" />
                    </xs:unique>
                </xs:element>
            </xs:sequence>
        </xs:extension>
    </xs:complexContent>

```

```

        </xs:complexContent>
    </xs:complexType>
    <xs:complexType name="TypeDescriptors">
        <xs:sequence>
            <xs:element name="TypeDescriptor" type="bdc:TypeDescriptor" minOccurs="1"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Actions">
        <xs:sequence>
            <xs:element name="Action" type="bdc:Action" minOccurs="1" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="Action">
        <xs:complexContent>
            <xs:extension base="bdc:MetadataObject">
                <xs:sequence>
                    <xs:element name="ActionParameters" type="bdc:ActionParameters" minOccurs="0">
                        <xs:unique name="ActionParameterNameKey">
                            <xs:selector xpath="*" />
                            <xs:field xpath="@Name" />
                        </xs:unique>
                    </xs:element>
                </xs:sequence>
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
    <xs:complexType name="ActionParameters">
        <xs:sequence>
            <xs:element name="ActionParameter" type="bdc:ActionParameter" minOccurs="1"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="ActionParameter">
        <xs:complexContent>
            <xs:extension base="bdc:MetadataObject">
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
    <xs:complexType name="Association">
        <xs:complexContent>
            <xs:extension base="bdc:IndividuallySecurableMetadataObject">
            </xs:extension>
        </xs:complexContent>
    </xs:complexType>
    <xs:complexType name="Property" mixed="true">
        <xs:attribute name="Name" type="bdc:NameString" use="required"/>
        <xs:attribute name="Type" type="bdc:TypeNameString" use="required"/>
    </xs:complexType>
    <xs:complexType name="Properties">
        <xs:sequence>
            <xs:element name="Property" type="bdc:Property" minOccurs="1" maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>
    <xs:complexType name="AccessControlList">
        <xs:sequence>
            <xs:element name="AccessControlEntry" type="bdc:AccessControlEntry" minOccurs="1"
maxOccurs="unbounded"/>
        </xs:sequence>
    </xs:complexType>

```

```

</xs:complexType>
<xs:complexType name="AccessControlEntry">
  <xs:sequence>
    <xs:element name="Right" type="bdc:Right" minOccurs="1" maxOccurs="unbounded"/>
  </xs:sequence>
  <xs:attribute name="Principal" type="xs:string" use="required"/>
</xs:complexType>
<xs:complexType name="Right">
  <xs:attribute name="BdcRight" type="bdc:BdcRightName" use="required"/>
</xs:complexType>
<xs:simpleType name="BdcRightName">
  <xs:restriction base="xs:string">
    <xs:enumeration value="None"/>
    <xs:enumeration value="Execute"/>
    <xs:enumeration value="Edit"/>
    <xs:enumeration value="SetPermissions"/>
    <xs:enumeration value="SelectableInClients"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="NameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="TypeNameString">
  <xs:restriction base="xs:string">
    <xs:minLength value="1"/>
    <xs:maxLength value="255"/>
  </xs:restriction>
</xs:simpleType>
<xs:simpleType name="VersionString">
  <xs:restriction base="xs:string">
    <xs:pattern value="[0-9]+(\.[0-9]+){1,3}"/>
  </xs:restriction>
</xs:simpleType>
</xs:schema>

```

6 Appendix B: Product Behavior

The information in this specification is applicable to the following Microsoft products or supplemental software. References to product versions include released service packs:

- Microsoft® SharePoint® Foundation 2010
- Microsoft® Office 2010 suites

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product 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.

[<1> Section 2.1.4.1:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

[<2> Section 2.1.4.3:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

[<3> Section 2.1.4.4:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

[<4> Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

[<5> Section 2.1.4.7:](#) SharePoint Foundation 2010 uses this to determine the namespace within which the classes of the generated Business Logic Module are placed.

[<6> Section 2.1.4.7:](#) 6A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

[<7> Section 2.1.4.7:](#) The specified type implements operations that are described in [\[MSDN-SharePointSDK\]](#)

[<8> Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

[<9> Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

[<10> Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

[<11> Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

[<12> Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<13> [Section 2.1.4.7:](#) A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<14> [Section 2.1.4.7:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<15> [Section 2.1.4.9:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<16> [Section 2.1.4.11:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<17> [Section 2.1.4.13:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<18> [Section 2.1.4.16:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<19> [Section 2.1.4.18:](#) SharePoint Foundation 2010 allows the following values as described in [\[MSDN-SharePointSDK\]](#): "Text" "StoredProcedure", or "TableDirect".

<20> [Section 2.1.4.18:](#) SharePoint Foundation 2010 currently ignores the value of this attribute.

<21> [Section 2.1.4.18:](#) SharePoint Foundation 2010 requires that the value of LobName matches the name of the operation in the line-of-business (LOB) system.

<22> [Section 2.1.4.18:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<23> [Section 2.1.4.20:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<24> [Section 2.1.4.22:](#) This attribute is deprecated; however, SharePoint Foundation 2010 evaluates this attribute when present for compatibility reasons.

<25> [Section 2.1.4.22:](#) This attribute is deprecated; however, SharePoint Foundation 2010 allows this attribute for compatibility reasons.

<26> [Section 2.1.4.22:](#) SharePoint Foundation 2010 ignores all index values specified in the path, and treats them as zero.

<27> [Section 2.1.4.22:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<28> [Section 2.1.4.24:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<29> [Section 2.1.4.25:](#) SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<30> [Section 2.1.4.34:](#) SharePoint Foundation 2010 expects the instantiated command to result in a well formed URL (Uniform Resource Locator) that is used in an HTTP GET operation.

<31> [Section 2.1.4.34:](#) SharePoint Foundation 2010 instantiates the abstract command in the context of an EntityInstance. The name of the ActionParameter is used to identify a field (4) of the EntityInstance. The placeholder is then replaced with the field (4) value.

<32> [Section 2.1.4.34](#): The behavior of SharePoint Foundation 2010 is polymorphic and depends on the actual ActionParameter value, as described in [\[CompositeFormatting\]](#).

<33> [Section 2.1.4.34](#): SharePoint Foundation 2010 expects the image dimensions to be 16 x 16 pixels.

<34> [Section 2.1.4.34](#): SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<35> [Section 2.1.4.36](#): SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<36> [Section 2.1.4.37](#): This attribute is deprecated; however, SharePoint Foundation 2010 evaluates this attribute when present for compatibility reasons.

<37> [Section 2.1.4.37](#): This attribute is deprecated; however, SharePoint Foundation 2010 allows this attribute for compatibility reasons.

<38> [Section 2.1.4.37](#): SharePoint Foundation 2010 ignores all index values specified in the path, and treats them as zero.

<39> [Section 2.1.4.37](#): SharePoint Foundation 2010 caches the metadata in memory if IsCached is true.

<40> [Section 2.1.5.1](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<41> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<42> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<43> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<44> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<45> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<46> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<47> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<48> [Section 2.1.5.16](#): A Business Logic Module that conforms to the [\[ECMA-335\]](#) specification and is understood by the .NET Framework.

<49> [Section 3.3](#): This example is using a fictitious web service and is not usable with SharePoint Foundation 2010 without modifications.

7 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

8 Index

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