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

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.
01/20/2012	1.6	Minor	Clarified the meaning of the technical content.
04/11/2012	1.6	No change	No changes to the meaning, language, or formatting of the technical content.
07/16/2012	1.6	No change	No changes to the meaning, language, or formatting of the technical content.
09/12/2012	1.6	No change	No changes to the meaning, language, or formatting of the technical content.
10/08/2012	1.7	Minor	Clarified the meaning of the technical content.
02/11/2013	2.0	Major	Significantly changed the technical content.
07/30/2013	2.1	Minor	Clarified the meaning of the technical content.
11/18/2013	2.1	No change	No changes to the meaning, language, or formatting of the technical content.

Date	Revision History	Revision Class	Comments
02/10/2014	2.1	No change	No changes to the meaning, language, or formatting of the technical content.
04/30/2014	2.2	Minor	Clarified the meaning of the technical content.
07/31/2014	2.2	No change	No changes to the meaning, language, or formatting of the technical content.
10/30/2014	2.3	Minor	Clarified the meaning 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.

Sections 1.7 and 2 of this specification are normative and can contain the terms MAY, SHOULD, MUST, MUST NOT, and SHOULD NOT as defined in [RFC2119]. All other sections and examples in this specification are informative.

1.1 Glossary

The following terms are defined in [MS-OFCGLOS]:

> **access control entry (ACE)**
> **access control list (ACL)**
> **AccessChecker**
> **Action**
> **ActionParameter**
> **ActivityTrackingFilter**
> **Association**
> **AssociationGroup**
> **AssociationNavigator**
> **AssociationReference**
> **Associator**
> **Augmented Backus-Naur Form (ABNF)**
> **base64 encoding**
> **BatchingPositionFilter**
> **BatchingTerminationFilter**
> **BinarySecurityDescriptorAccessor**
> **bind**
> **BulkAssociatedIdEnumerator**
> **BulkAssociationNavigator**
> **BulkIdEnumerator**
> **BulkSpecificFinder**
> **Business Logic Module**
> **ChangedIdEnumerator**
> **claim value**
> **ComparisonFilter**
> **Coordinated Universal Time (UTC)**
> **Creator**
> **DefaultValue**
> **DeletedIdEnumerator**
> **Deleter**
> **Disassociator**
> **display name**
> **domain account**
> **domain name**
> **endpoint**

Entity
EntityInstance
field
filter
FilterDescriptor
Finder
GenericInvoker
GUID
Identifier
IdEnumerator
InputFilter
InputOutputFilter
language code identifier (LCID)
LastIdFilter
LimitFilter
line-of-business (LOB) system
LobSystem
LobSystemInstance
locale
localized name
MetadataModel
MetadataObject
Method
MethodInstance
Model
Open Data Protocol (OData)
OutputFilter
PageNumberFilter
Parameter
PasswordCredentialFilter
Property
ReturnTypeDescriptor
rights
root TypeDescriptor
Scalar
security principal
SpecificFinder
SsoTicketFilter
StreamAccessor
time zone
TimeStampFilter
TypeDescriptor
Unicode
Uniform Resource Identifier (URI)
Uniform Resource Locator (URL)
Updater
UserContextFilter
UserCultureFilter
UsernameCredentialFilter
UserProfileFilter
View
web service
Web Services Description Language (WSDL)
WildcardFilter

XML
XML schema definition (XSD)

The following terms are specific to this document:

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

1.2 References

References to Microsoft Open Specification documents do not include a publishing year because links
are to the latest version of the documents, which are updated frequently. References to other
documents include a publishing year when one is available.

1.2.1 Normative References

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

[ECMA-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".

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

[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.rfc-editor.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

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

1.2.2 Informative References

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

[MS-CSOMSPT] Microsoft Corporation, "SharePoint Client-Side Object Model Protocol".

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

[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/

1.3 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

This file format is an **XML schema definition (XSD)** file, as described in [XMLSCHEMA1] and [XMLSCHEMA2].

1.5   Applicability Statement

There are typically two types of applications that can use this file format, 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 this file format.

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

1.7 Vendor-Extensible Fields

This file format defines vendor-extensible fields in the **Properties** element described in section 2.2.3.31.

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

2.1.1   Elements

2.1.1.1   Model

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

A **Model** (section 2.1.3.34) 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"/>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.2   Attributes

None.

2.1.3   Complex Types

2.1.3.1   AccessControlEntry

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

Referenced by: AccessControlList

A complex type that specifies an **ACE** to specify access rights for the parent element.

Child Elements:

Right: A **Right** element (section 2.1.3.41) 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 **Uniform Resource Identifier (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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.2 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 (section 2.1.3.1) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.3 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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

ActionParameters: An **ActionParameters** element (section 2.1.3.5) that specifies the Parameters of the **Action**.

Attributes:

Position: An **ActionPosition** attribute (section 2.1.4.1) 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: A **UrlString** attribute (section 2.1.4.17) that specifies an abstract command that is interpreted by an application reading this structure. The interpretation is implementation-specific.<1> The attribute includes 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.<2>

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
```

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```
      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.<3>

ImageUrl: A **UrlString** attribute that specifies the **Uniform Resource Locator (URL)** to the **Action**'s icon image.<4>

Name: A **NameString** attribute (section 2.1.4.9) 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<5> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.4   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

Attributes:

> **Index:** An **Ordinal** attribute (section 2.1.4.11) that specifies the position of this **ActionParameter** among the other **ActionParameters** in the **Action** that contains the **ActionParameter**.

> **Name:** A **NameString** attribute (section 2.1.4.9) 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<6> 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="ActionParameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:attribute name="Index" type="bdc:Ordinal" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.5 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 (section 2.1.3.4) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.6 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 (section 2.1.3.3) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.7   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

SourceEntity: A **SourceEntity** element (section 2.1.3.42) that specifies a source Entity of the **Association**.

DestinationEntity: A **DestinationEntity** element (section 2.1.3.14) that specifies the destination **Entity** of the **Association**.

Attributes:

Type: A **MethodInstanceType** attribute (section 2.1.4.8) 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 (section 2.1.4.9) 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**, **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<7> 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 (section 2.1.4.13) 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<8> be used.

ReturnTypeDescriptorPath: An **xs:string** attribute that specifies the path<9> to the return value of the **MethodInstance**. The value of this attribute 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 the following data structure (represented in "<property name> : <property value>" pairing)

```
Customer
  Name : "Blake"
  Surname : "Donley"
  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 "Donley"; And the path "Customer.Addresses" specifies the data structure with name "Addresses" that contains a collection of Address data structures.

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 (section 2.1.4.9) 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<10> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.8   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

AssociationReference: An **AssociationReference** element (section 2.1.3.10) that specifies an **AssociationReference** of the **AssociationGroup**.

Attributes:

Name: A **NameString** attribute (section 2.1.4.9) 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<11> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.9   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 (section 2.1.3.8) 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:sequence>
  </xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.10   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 (section 2.1.4.9) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.11   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 (section [2.1.4.16](#)) 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>
```

See section [5.1](#) for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.12   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 set to "In" or "InOut".

Attributes:

> **MethodInstanceName:** A **NameString** attribute (section 2.1.4.9) that specifies the name of the **MethodInstance** to which this **DefaultValue** refers.

> **Type:** A **TypeDescriptorTypeNameString** attribute (section 2.1.4.15) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.13   DefaultValues

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

Referenced by: TypeDescriptor

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

Child Elements:

> **DefaultValue:** A **DefaultValue** element (section 2.1.3.12) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.14   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 (section 2.1.4.9) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.15   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 (section 2.1.3.16) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.16   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

Identifiers: An **Identifiers** element (section 2.1.3.20) that specifies the Identifiers of the **Entity**.

Methods: A **Methods** element (section 2.1.3.33) that specifies the Methods of the **Entity**.

AssociationGroups: An **AssociationGroups** element (section 2.1.3.9) that specifies the AssociationGroups of the **Entity**.

Actions: An **Actions** element (section 2.1.3.6) that specifies the Actions of the **Entity**.

Attributes:

Namespace: A **NameString** attribute (section 2.1.4.9) that specifies the namespace of the **Entity**.

Version: A **VersionString** attribute (section 2.1.4.18) that specifies the version number of the **Entity**.

EstimatedInstanceCount: An **InstanceCount** attribute (section 2.1.4.5) that specifies the estimated number of **EntityInstances** contained by the line-of-business (LOB) system.

DefaultOperationMode: An **OperationModeType** attribute (section 2.1.4.10) that specifies the default behavior when interacting with a LOB system in an implementation-specific manner while creating, deleting, updating or reading EntityInstance data of the **Entity**.

Name: A **NameString** attribute (section 2.1.4.9) 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<12> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.17   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

Attributes:

Type: A **FilterDescriptorType** attribute (section 2.1.4.3) that specifies the type of the **FilterDescriptor**.

FilterField: A **NameString** attribute (section 2.1.4.9) 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 (section 2.1.4.9) 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<13> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.18   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 (section 2.1.3.17) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.19   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

Attributes:

TypeName: An **IdentifierType** attribute (section 2.1.4.4) that specifies the data type of the value corresponding to the **Identifier**.

Name: A **NameString** attribute (section 2.1.4.9) 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<14> 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="Identifier">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject">
      <xs:attribute name="TypeName" type="bdc:IdentifierType" use="required"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.20   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 (section 2.1.3.19) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.21   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

> **AccessControlList:** An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

Attributes:

> **Name:** A **NameString** attribute (section 2.1.4.9) 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<15> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.22   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 (section 2.1.3.11) that specifies the conversion of a data type to another data type.

NormalizeDateTime: A **NormalizeDateTime** element (section 2.1.3.35) 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 (section 2.1.3.36) that specifies the conversion rules of the empty string or null value obtained from a 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.23   LobSystem

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

Referenced by: LobSystems

A complex type that specifies an LobSystem.

For the **Properties** child element of LobSystem, the following three properties can be set and gotten by the [MS-CSOMSPT] methods **SetLobSystemProperty** ([MS-CSOMSPT] section 3.2.5.210.2.1.7) and **GetLobSystemProperty** ([MS-CSOMSPT] section 3.2.5.210.2.1.3).

WcfMexDocumentUrl: A URL that points to the **Web Services Description Language (WSDL)** of the WCF service to which you are connecting, for example "http://www.example.org/service.svc?wsdl".

ODataServiceMetadataUrl:<16> A URL that points to the service metadata of the OData service to which you are connecting, for example "http://odata.netflix.com/v2/Catalog/$metadata".

ODataConnectionSettingsId:<17> Represents the identifier for an external connection to an OData service. An external connection is a structure which encapsulates connection-specific properties such as URL, Authentication Mode, or Credentials created by the Farm or Tenant admin.

Child Elements:

> **LocalizedDisplayNames:** A **LocalizedDisplayNames** element (section 2.1.3.28) that specifies the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

> **AccessControlList:** An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

> **Proxy:** An **xs:string** element that specifies the **base64 encoding** representation specified in [RFC4648] of the information about **Business Logic Modules**<18> 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.[19]

WebServiceHash: An implementation-specific identifier of the Business Logic Module[20] 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[21] represented by the WcfModule. **Hash** MUST be "WcfHash" when the **Type** attribute of the **LobSystem** is "Wcf".

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

CustomHash: An implementation-specific identifier of the Business Logic Module[22] 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.[23] Modules MUST be **CustomModule** when the **Type** attribute of the **LobSystem** is "Custom"

LobSystemInstances: An **LobSystemInstances** element (section 2.1.3.25) that specifies a list of LobSystemInstances of the **LobSystem**.

Entities: An **Entities** element (section 2.1.3.15) that specifies a list of Entities of the **LobSystem**.

Attributes:

Type: An **LobSystemType** attribute (section 2.1.4.7) that specifies the type of the **LobSystem**.

Name: A **NameString** attribute (section 2.1.4.9) 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<24> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.24   LobSystemInstance

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

Referenced by: LobSystemInstances

A complex type that specifies a LobSystemInstance of a LobSystem.

For the **Properties** child element of LobSystem, the following four properties can be set and gotten by the [MS-CSOMSPT] methods **SetLobSystemInstanceProperty** ([MS-CSOMSPT] section 3.2.5.210.2.1.6) and **GetLobSystemInstanceProperty** ([MS-CSOMSPT] section 3.2.5.210.2.1.2).

WcfEndPointAddress: A URL of the WCF service **endpoint** (4) to which you are connecting, for example "http://www.example.org/service.svc".

ODataServiceUrl: A URL of the OData service endpoint (4) to which you are connecting, for example "http://odata.netflix.com/v2/Catalog".

RdbConnection Data Source: The database instance to which you are connecting, for example "mySQLServer\mySqlInstance".

ODataConnectionSettingsId:<25> Represents the identifier for an external connection to an OData service. An external connection is a structure which encapsulates connection-specific properties such as URL, Authentication Mode, or Credentials created by the Farm or Tenant admin.

Child Elements:

LocalizedDisplayNames: A **LocalizedDisplayNames** element (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.1.4.9) 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<26> 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="LobSystemInstance">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.25   LobSystemInstances

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

Referenced by: LobSystem

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

Child Elements:

LobSystemInstance: An **LobSystemInstance** element (section 2.1.3.24) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.26 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: An **LobSystem** element (section 2.1.3.23) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.27 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 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.28   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 (section 2.1.3.27) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.29   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 (section 2.1.3.28) that specifies
   the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.1.4.9) 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<27> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.30 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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

FilterDescriptors: A **FilterDescriptors** element (section 2.1.3.18) that specifies the FilterDescriptors of the **Method**.

Parameters: A **Parameters** element (section 2.1.3.38) 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 (section 2.1.3.32) 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.<28> 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 (section 2.1.4.9) 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 an LOB system named "CN1A" can be represented by a **Method** with **Name** attribute equal to "GetCustomerByName". The **LobName** attribute of this **Method** can<29> be "CN1A".

Name: A **NameString** attribute (section 2.1.4.9) 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<30> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.31   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

Attributes:

Type: A **MethodInstanceType** attribute (section 2.1.4.8) 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 (section 2.1.4.9) 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, 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<31> 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 (section 2.1.4.13) 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<32> be used.

ReturnTypeDescriptorPath: An **xs:string** attribute that specifies the path<33> to the return value of the **MethodInstance**. The value of this attribute 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 the following data structure (represented in "<property name> : <property value>" pairing)

```
Customer
  Name : "Blake"
  Surname : "Donley"
  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 "Donley"; And the path "Customer.Addresses" specifies the data structure with name "Addresses" that contains a collection of Address data structures.

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 (section 2.1.4.9) 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<34> 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="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="xs:string" use="optional"/>
    </xs:extension>
  </xs:complexContent>
</xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.32   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 (section 2.1.3.7) that specifies an Association.

MethodInstance: A **MethodInstance** element (section 2.1.3.31) 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:element name="MethodInstance" type="bdc:MethodInstance"/>
  </xs:choice>
</xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.33 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 (section 2.1.3.30) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.34 Model

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

A complex type that specifies a Model. **Models** refer to Entities. This complex type contains the **LobSystems** element (section 2.1.3.26) that specifies the LobSystems containing the **Entities** the **Model** refers to.

Child Elements:

LocalizedDisplayNames: A **LocalizedDisplayNames** element (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.1.3.2) that specifies the access control list (ACL) of the **Model**.

LobSystems: An **LobSystems** element (section 2.1.3.26) that specifies the **LobSystems** that contain the **Entities** to which the **Model** refers.

Attributes:

Name: A **NameString** attribute (section 2.1.4.9) 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<35> 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.35 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 (section 2.1.4.6) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.36 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 (section 2.1.4.14) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.37   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

> **TypeDescriptor:** A **TypeDescriptor** element (section 2.1.3.43) that specifies the root TypeDescriptor of the **Parameter**.

Attributes:

> **Direction:** A **ParameterDirection** attribute (section 2.1.4.12) that specifies the direction of the **Parameter**.

> **Name:** A **NameString** attribute (section 2.1.4.9) 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<36> 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="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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.38   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 (section 2.1.3.37) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.39   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 (section 2.1.3.40) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.40   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 (section 2.1.4.9) that specifies the Property name.

Type: A **TypeNameString** attribute (section 2.1.4.16) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.41 Right

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

Referenced by: AccessControlEntry

A complex type that specifies a single access permission for an ACE.

Attributes:

BdcRight: A **BdcRightName** attribute (section 2.1.4.2) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.42 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 (section 2.1.4.9) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.43   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 (section 2.1.3.28) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.1.3.39) that specifies the Properties of the **Model**.

Interpretation: An **Interpretation** element (section 2.1.3.22) that specifies rules for the data stored by the data structure represented by the **TypeDescriptor**.

DefaultValues: A **DefaultValues** element (section 2.1.3.13) that specifies the DefaultValues of the **TypeDescriptor**.

TypeDescriptors: A **TypeDescriptors** element (section 2.1.3.44) that specifies the child TypeDescriptors of the **TypeDescriptor**.

Attributes:

TypeName: A **TypeDescriptorTypeNameString** attribute (section 2.1.4.15) that specifies the implementation-specific identifier of the data type of the data structure that is represented by the **TypeDescriptor**.

LobName: A **NameString** attribute (section 2.1.4.9) that specifies the name of the data structure that is represented by 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". The default value of this attribute is the name of the **TypeDescriptor**.

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.

IsSortInput: An **xs:boolean** attribute that specifies whether the value stored by the data structure represented by this **TypeDescriptor** stores the input value for the **SortingFilter**. When this attribute is not specified, the **SortingFilter** must be assumed to not being set and the default sort order should be used to fetch data from the line-of-business (LOB) system. The value MUST be as listed in the following table.

Value	Description
False	The **TypeDescriptor** does not specify the input to the SortingFilter.
True	The **TypeDescriptor** specified the input to the SortingFilter.

Name: A **NameString** attribute (section 2.1.4.9) 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<37> 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="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:attribute name="IsSortInput" type="xs:boolean" default="false" use="optional"/>
      </xs:extension>
    </xs:complexContent>
  </xs:complexType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.3.44 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 (section 2.1.3.43) 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4 Simple Types

2.1.4.1 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.2 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.3 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**.
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**.
Sorting	The **FilterDescriptor** is a **SortingFilter**.

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:enumeration value="Sorting"/>
    </xs:restriction>
  </xs:simpleType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.4   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 through 255.
System.Char	A **Unicode** character.
System.DateTime	A date and time ranging from 12:00:00 midnight, January 1, 1 A.D. (Common Era) to 11:59:59 P.M., December 31, 9999 A.D. (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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.5 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.6 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. 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>
```

See section [5.1](#) for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.7 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 LOB system MUST be stored as Properties on the **LobSystem**, as specified in section [2.1.3.40](#). The value MUST be listed in the following table.

Value	Meaning
Database	The represented LOB system is a database.
DotNetAssembly	The represented LOB system is a set of Business Logic Modules.[<38>](#)
Wcf	The represented LOB system is a service for which the endpoint (4) URI, the **bind** process and the contract is specified.
WebService	The represented LOB system is a **Web service**.
Custom	The represented LOB system is a LOB system for which external business logic manages the connection and data transfer through an implementation-specific extensibility mechanism.

Value	Meaning
OData	The represented LOB system is an **OData service**.

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:enumeration value="OData"/>
  </xs:restriction>
</xs:simpleType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.8 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.
Updater	The **MethodInstance** is an Updater.

Value	Meaning
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**.
EventSubscriber	The **MethodInstance** is an EventSubscriber.
EventUnsubscriber	The **MethodInstance** is an EventUnsubscriber.

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:enumeration value="EventSubscriber"/>
    <xs:enumeration value="EventUnsubscriber"/>
  </xs:restriction>
</xs:simpleType>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.9   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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.10 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 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 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.11   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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.12   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.
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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.13   ReturnTypeDescriptorLevel

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

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

The depth from the root of the ReturnTypeDescriptor 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="ReturnTypeDescriptorLevel">
  <xs:restriction base="xs:integer">
    <xs:minInclusive value="0"/>
    <xs:maxInclusive value="29"/>
  </xs:restriction>
</xs:simpleType>
```

See section [5.1]() for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.14   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>
```

See section [5.1]() for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.15   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<39> associated with the Parameter which contains this **TypeDescriptor**. The Business Logic Module<40> 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<41> 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<42> 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 in the **Property** with name "SystemUtilityTypeName" and type "System.String", specifies a Business Logic Module<43> for the purpose of mapping value of **typeName** element to a data type, the specified Business Logic Module<44> MUST be used.

3. If previous conditions are not met, implementation-specific Business Logic Module<45> 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** that contains the **Method** which contains the **Parameter** which contains the TypeDescriptor.

The occurrence of **BusinessLogicModule** in the preceding ABNF MUST yield to an **LobSystemName**, if the represented data type resides in the Business Logic Module<46> 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.
System.UInt16	A number ranging from 0 to 65535 inclusive.

Value	Description
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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.16   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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.17   UrlString

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

Referenced by: Action

A simple type used to restrict the length of URL 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.1.4.18   VersionString

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

Referenced by: Entity

A set of four 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>
```

See section 5.1 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2 http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources

2.2.1 Elements

2.2.1.1 Model

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

A **Model** element (section 2.2.3.28) 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"/>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.2 Attributes

None.

2.2.3 Complex Types

2.2.3.1 AccessControlEntry

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

Referenced by: AccessControlList

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

Child Elements:

Right: A **Right** element (section 2.2.3.33) 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 conforms to the trusted STS as specified in [MS-SPSTWS] section 2.2.2.

The **claimType** rule is 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.2   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 (section 2.2.3.1) that specifies an 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.3 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 (section 2.2.3.22) that specifies
>   the localized names of the **Model**.

>   **Properties:** A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

>   **ActionParameters:** An **ActionParameters** element (section 2.2.3.5) that specifies the
>   Parameters of the **Action**.

Attributes:

>   **Name:** A **NameString** attribute (section 2.2.4.2) 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="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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.4 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 (section 2.2.3.22) that specifies the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

Attributes:

> **Name:** A **NameString** attribute (section 2.2.4.2) 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="ActionParameter">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.5   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 (section 2.2.3.4) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.6   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 (section 2.2.3.3) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.7   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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.2.3.2) that specifies the access control list (ACL) of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="Association">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.8   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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="AssociationGroup">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.9   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 (section 2.2.3.8) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.10   Entities

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

Referenced by: LobSystem

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

Child Elements:

Entity: An **Entity** element (section 2.2.3.11) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.11 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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.2.3.2) that specifies the access control list (ACL) of the **Model**.

Identifiers: An **Identifiers** element (section 2.2.3.15) that specifies the Identifiers of the **Entity**.

Methods: A **Methods** element (section 2.2.3.27) that specifies the Methods of the **Entity**.

AssociationGroups: An **AssociationGroups** element (section 2.2.3.9) that specifies the AssociationGroups of the **Entity**.

Actions: An **Actions** element (section 2.2.3.6) that specifies the Actions of the **Entity**.

Attributes:

Namespace: A **NameString** attribute (section 2.2.4.2) that specifies the namespace of the **Entity**.

Version: A **VersionString** attribute (section 2.2.4.4) that specifies the version number of the **Entity**.

Name: A **NameString** attribute (section 2.2.4.2) 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="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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.12   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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="FilterDescriptor">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.13   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 (section 2.2.3.12) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.14   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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="Identifier">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.15 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 (section 2.2.3.14) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.16 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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.2.3.2) that specifies the access control list (ACL) of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.17   LobSystem

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

Referenced by: LobSystems

A complex type that identifies an LobSystem.

Child Elements:

LocalizedDisplayNames: A **LocalizedDisplayNames** element (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.2.3.2) that specifies the access control list (ACL) of the **Model**.

LobSystemInstances: An **LobSystemInstances** element (section 2.2.3.19) that specifies a list of LobSystemInstances of the **LobSystem**.

Entities: An **Entities** element (section 2.2.3.10) that specifies a list of Entities of the **LobSystem**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.18 LobSystemInstance

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

Referenced by: LobSystemInstances

A complex type that identifies an LobSystemInstance of an LobSystem.

Child Elements:

> **LocalizedDisplayNames:** A **LocalizedDisplayNames** element (section 2.2.3.22) that specifies the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

Attributes:

> **Name:** A **NameString** attribute (section 2.2.4.2) 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="LobSystemInstance">
  <xs:complexContent>
    <xs:extension base="bdc:MetadataObject"/>
  </xs:complexContent>
</xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.19   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: An **LobSystemInstance** element (section 2.2.3.18) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.20   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: An **LobSystems** element (section 2.2.3.20) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.21   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 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.22 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 **LocalizedDisplayNames** element (section 2.2.3.22) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.23 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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.24 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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.2.3.2) that specifies the access control list (ACL) of the **Model**.

FilterDescriptors: A **FilterDescriptors** element (section 2.2.3.13) that specifies the FilterDescriptors of the **Method**.

Parameters: A **Parameters** element (section 2.2.3.30) that specifies the Parameters of the **Method**.

MethodInstances: A **MethodInstances** element (section 2.2.3.26) that specifies the MethodInstances of the **Method**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.25 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 (section 2.2.3.22) that specifies
    the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

AccessControlList: An **AccessControlList** element (section 2.2.3.2) that specifies the access
    control list (ACL) of the **Model**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="MethodInstance">
  <xs:complexContent>
    <xs:extension base="bdc:IndividuallySecurableMetadataObject"/>
  </xs:complexContent>
```

```
        </xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.26   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 (section 2.2.3.7) that specifies an Association.

> **MethodInstance:** A **MethodInstance** element (section 2.2.3.25) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.27   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 (section 2.2.3.24) 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:key name="MethodMethodInstanceNameKey">
        <xs:selector xpath=".//bdc:MethodInstances/*"/>
```

```
            <xs:field xpath="@Name"/>
          </xs:key>
       </xs:element>
     </xs:sequence>
  </xs:complexType>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.28   Model

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

A complex type that identifies a Model.

Child Elements:

> **LocalizedDisplayNames:** A **LocalizedDisplayNames** element (section 2.2.3.22) that specifies
> the localized names of the **Model**.

> **Properties:** A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

> **AccessControlList:** An **AccessControlList** element (section 2.2.3.2) that specifies the access
> control list (ACL) of the **Model**.

> **LobSystems:** An **LobSystems** element (section 2.2.3.20) that specifies the LobSystems of the
> **Model**.

Attributes:

> **Name:** A **NameString** attribute (section 2.2.4.2) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.29   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 (section 2.2.3.22) that specifies the localized names of the **Model**.
>
> **Properties:** A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.
>
> **TypeDescriptor:** A **TypeDescriptor** element (section 2.2.3.34) that specifies the root TypeDescriptor of the **Parameter**.

Attributes:

> **Name:** A **NameString** attribute (section 2.2.4.2) 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="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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.30 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 (section 2.2.3.29) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.31 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 (section 2.2.3.32) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.32 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 (section 2.2.4.2) that specifies the name of the **Property**.

Type: A section **TypeNameString** attribute (section 2.2.4.3) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.33 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 ACE.

Attributes:

BdcRight: A **BdcRight** attribute (section 2.2.4.1) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.34   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 (section 2.2.3.22) that specifies the localized names of the **Model**.

Properties: A **Properties** element (section 2.2.3.31) that specifies the Properties of the **Model**.

TypeDescriptors: A **TypeDescriptors** element (section 2.2.3.35) that specifies the child **TypeDescriptors** of the **TypeDescriptor**.

Attributes:

Name: A **NameString** attribute (section 2.2.4.2) 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="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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.3.35   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 (section 2.2.3.34) 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.4   Simple Types

2.2.4.1   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

Value	Meaning
	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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.4.2   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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.4.3   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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

2.2.4.4   VersionString

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

Referenced by: Entity

A set of four 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>
```

See section 5.2 for the full W3C XML Schema ([XMLSCHEMA1] section 2.1).

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
<?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>
      <Entities>
        <Entity Name="Customer" Namespace="example.com" Version="1.0.0.0">
          <Identifiers>
            <Identifier Name="CustomerIdentifier" TypeName="System.Int32" />
          </Identifiers>
          <Methods>
            <Method Name="GetCustomer">
```

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```xml
            <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="CustomerIdentifier" />
              </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="CustomerIdentifier" />
                        <TypeDescriptor Name="FirstName" TypeName="System.String" />
                        <TypeDescriptor Name="LastName" TypeName="System.String" />
                      </TypeDescriptors>
                    </TypeDescriptor>
                  </TypeDescriptors>
                </TypeDescriptor>
              </Parameter>
            </Parameters>
            <MethodInstances>
              <!-- The ReturnParameterName and ReturnTypeDescriptor 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" ReturnTypeDescriptorName="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
<?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" ReturnTypeDescriptorName="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.<47>

```xml
<?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="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>
```

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```
                <MethodInstance Name="GetCustomer" Type="SpecificFinder"
ReturnParameterName="Customers" ReturnTypeDescriptorName="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>
```

```xml
                    </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" ReturnTypeDescriptorName="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 create, read, update, and delete (CRUD) stereotypes for an entity.

```xml
<?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="CustomerIdentifier" 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="CustomerIdentifier" />
                </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
<?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" ReturnTypeDescriptorName="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">
            <TypeDescriptor Name="Id" TypeName="System.Int64"
IdentifierName="OrderIdentifier" />
          </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="Order" 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>
          <MethodInstance Name="GetOrder" Type="SpecificFinder"
ReturnParameterName="Orders" ReturnTypeDescriptorName="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

4.1 Security Considerations for Implementers

The **proxy** attribute of the **LobSystem** element (section 2.1.3.23) contain the binary representation of a Business Logic Module. When loading modules, verification is recommended to ensure the module origin is trusted.

4.2 Index of Security Fields

None.

5   Appendix A: Full XML Schemas

For ease of implementation, the following sections provide the full XML schema for this protocol.

Schema name	Prefix	Section
BusinessDataCatalog Schema	bdc	5.1
BusinessDataCatalog Resources Schema	bdc	5.2

5.1   http://schemas.microsoft.com/windows/2007/BusinessDataCatalog Schema

```
<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>
```

```xml
        <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:enumeration value="OData"/>
      </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"/>
```

```xml
            <xs:enumeration value="System.UInt16"/>
            <xs:enumeration value="System.UInt32"/>
            <xs:enumeration value="System.UInt64"/>
        </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="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>
    <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"/>
```

```xml
        </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:enumeration value="Sorting"/>
      </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="xs:string" use="optional"/>
        </xs:extension>
      </xs:complexContent>
    </xs:complexType>
    <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"/>
```

```xml
      <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:enumeration value="EventSubscriber"/>
      <xs:enumeration value="EventUnsubscriber"/>
    </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:attribute name="IsSortInput" type="xs:boolean" default="false" 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">
```

```xml
          <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>
```

```xml
          <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">
```

```xml
            <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
http://schemas.microsoft.com/windows/2007/BusinessDataCatalog/Resources Schema

```xml
<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="*"/>
```

```xml
          <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: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: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: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:complexType>
  <xs:complexType name="TypeDescriptors">
    <xs:sequence>
```

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

- Microsoft SharePoint Foundation 2013

- Microsoft Office 2013

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 2.1.3.3: SharePoint Foundation 2010 and SharePoint Foundation 2013 expect the instantiated command to result in a well formed URL that is used in an HTTP GET operation.

<2> Section 2.1.3.3: SharePoint Foundation 2010 and SharePoint Foundation 2013 instantiate 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.

<3> Section 2.1.3.3: The behavior of SharePoint Foundation 2010 and SharePoint Foundation 2013 are polymorphic and depend on the actual **ActionParameter** value, as described in [CompositeFormatting].

<4> Section 2.1.3.3: SharePoint Foundation 2010 and SharePoint Foundation 2013 expect the image dimensions to be 16 by 16 pixels.

<5> Section 2.1.3.3: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<6> Section 2.1.3.4: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<7> Section 2.1.3.7: This attribute is deprecated; however, SharePoint Foundation 2010 and SharePoint Foundation 2013 evaluate this attribute when present for compatibility reasons.

<8> Section 2.1.3.7: This attribute is deprecated; however, SharePoint Foundation 2010 and SharePoint Foundation 2013 allow this attribute for compatibility reasons.

<9> Section 2.1.3.7: SharePoint Foundation 2010 and SharePoint Foundation 2013 ignore all index values specified in the path, and threat them as zero.

<10> Section 2.1.3.7: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<11> Section 2.1.3.8: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<12> Section 2.1.3.16: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<13> Section 2.1.3.17: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<14> Section 2.1.3.19: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<15> Section 2.1.3.21: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<16> Section 2.1.3.23: This property is only available in SharePoint Foundation 2013.

<17> Section 2.1.3.23: This property is only available in SharePoint Foundation 2013.

<18> Section 2.1.3.23: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<19> Section 2.1.3.23: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<20> Section 2.1.3.23: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<21> Section 2.1.3.23: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<22> Section 2.1.3.23: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<23> Section 2.1.3.23: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<24> Section 2.1.3.23: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<25> Section 2.1.3.24: This property is only available in SharePoint Foundation 2013.

<26> Section 2.1.3.24: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<27> Section 2.1.3.29: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<28> Section 2.1.3.30: SharePoint Foundation 2010 and SharePoint Foundation 2013 currently ignore the value of this attribute.

<29> Section 2.1.3.30: SharePoint Foundation 2010 and SharePoint Foundation 2013 require that the value of **LobName** matches the name of the operation in the line-of-business (LOB) system.

<30> Section 2.1.3.30: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<31> Section 2.1.3.31: This attribute is deprecated; however, SharePoint Foundation 2010 and SharePoint Foundation 2013 evaluate this attribute when present for compatibility reasons.

<32> Section 2.1.3.31: This attribute is deprecated; however, SharePoint Foundation 2010 and SharePoint Foundation 2013 allow this attribute for compatibility reasons.

<33> Section 2.1.3.31: SharePoint Foundation 2010 and SharePoint Foundation 2013 ignore all index values specified in the path, and threat them as zero.

<34> Section 2.1.3.31: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<35> Section 2.1.3.34: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<36> Section 2.1.3.37: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<37> Section 2.1.3.43: SharePoint Foundation 2010 and SharePoint Foundation 2013 cache the metadata in memory if **IsCached** is **true**.

<38> Section 2.1.4.7: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<39> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<40> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<41> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<42> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<43> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<44> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<45> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<46> Section 2.1.4.15: A Business Logic Module that conforms to the [ECMA-335] specification and is understood by the .NET Framework.

<47> Section 3.3: This example is using a fictitious web service and is not usable with SharePoint Foundation 2010 and SharePoint Foundation 2013 without modifications.

7   Change Tracking

This section identifies changes that were made to the [MS-BDCMFFS] protocol document between the July 2014 and October 2014 releases. Changes are classified as New, Major, Minor, Editorial, or No change.

The revision class **New** means that a new document is being released.

The revision class **Major** means that the technical content in the document was significantly revised. Major changes affect protocol interoperability or implementation. Examples of major changes are:

▪   A document revision that incorporates changes to interoperability requirements or functionality.

▪   The removal of a document from the documentation set.

The revision class **Minor** means that the meaning of the technical content was clarified. Minor changes do not affect protocol interoperability or implementation. Examples of minor changes are updates to clarify ambiguity at the sentence, paragraph, or table level.

The revision class **Editorial** means that the formatting in the technical content was changed. Editorial changes apply to grammatical, formatting, and style issues.

The revision class **No change** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the technical content of the document is identical to the last released version.

Major and minor changes can be described further using the following change types:

▪   New content added.

▪   Content updated.

▪   Content removed.

▪   New product behavior note added.

▪   Product behavior note updated.

▪   Product behavior note removed.

▪   New protocol syntax added.

▪   Protocol syntax updated.

▪   Protocol syntax removed.

▪   New content added due to protocol revision.

▪   Content updated due to protocol revision.

▪   Content removed due to protocol revision.

▪   New protocol syntax added due to protocol revision.

▪   Protocol syntax updated due to protocol revision.

▪   Protocol syntax removed due to protocol revision.

- Obsolete document removed.

Editorial changes are always classified with the change type **Editorially updated.**

Some important terms used in the change type descriptions are defined as follows:

- **Protocol syntax** refers to data elements (such as packets, structures, enumerations, and methods) as well as interfaces.

- **Protocol revision** refers to changes made to a protocol that affect the bits that are sent over the wire.

The changes made to this document are listed in the following table. For more information, please contact dochelp@microsoft.com.

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
2.1.3.3 Action	Added SharePoint Foundation 2013.	N	Product behavior note updated.
2.1.3.3 Action	Updated product behavior notes to include all applicable product versions.	N	Product behavior note updated.
2.1.3.30 Method	Added SharePoint Foundation 2013.	N	Product behavior note updated.
2.1.3.30 Method	Updated product behavior notes to include all applicable product versions.	N	Product behavior note updated.
2.1.3.31 MethodInstance	Added SharePoint Foundation 2013.	N	Product behavior note updated.
2.1.3.31 MethodInstance	Updated product behavior notes to include all applicable product versions.	N	Product behavior note updated.
2.1.3.34 Model	Added SharePoint Foundation 2013.	N	Product behavior note updated.
2.1.3.34 Model	Updated product behavior note to include all applicable product versions.	N	Product behavior note updated.
3.3 Web Service Model	Added SharePoint Foundation 2013.	N	Product behavior note updated.
3.3 Web Service Model	Updated product behavior note to include all applicable product versions.	N	Product behavior note updated.

Release: October 30, 2014

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Release: October 30, 2014

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