[MS-UDCX]:
Universal Data Connection 2.0 XML File Format

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Revision Summary

Date	Revision History	Revision Class	Comments
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06/27/2008	1.0	Editorial	Revised and edited technical content
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Table of Contents

1   Introduction

This document specifies the Universal Data Connection 2.0 XML File Structure, which provides a container for data connection information. A Universal Data Connection (UDC) file uses XML to represent this information.

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 RFC 2119. All other sections and examples in this specification are informative.

1.1   Glossary

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

Augmented Backus-Naur Form (ABNF)
authentication
credential
GUID
Hypertext Transfer Protocol (HTTP)
Kerberos
XML

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

absolute URL
data connection
data source
document library
explicit authentication
form template
HTTP POST
list
message body
Representational State Transfer (REST)
server-relative URL
Simple Object Access Protocol (SOAP)
single sign-on (SSO)
site
SOAP node
Structured Query Language (SQL)
Uniform Resource Locator (URL)
Universal Data Connection (.udc, .udcx) file
web service
Web Services Description Language (WSDL)
WSDL operation
XML namespace
XML namespace prefix
XML schema

The following terms are specific to this document:

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

1.2 References

References to Microsoft Open Specifications documentation do not include a publishing year because links are to the latest version of the technical 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. Please check the archive site, http://msdn2.microsoft.com/en-us/library/E4BD6494-06AD-4aed-9823-445E921C9624, as an additional source.

[MS-ADTG] Microsoft Corporation, "Remote Data Services (RDS) Transport Protocol Specification".

[MS-FSPP] Microsoft Corporation, "Forms Services Proxy Web Service Protocol Specification".

[MS-SFU] Microsoft Corporation, "Kerberos Protocol Extensions: Service for User and Constrained Delegation Protocol Specification".

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

[RFC2396] Berners-Lee, T., Fielding, R., and Masinter, L., "Uniform Resource Identifiers (URI): Generic Syntax", RFC 2396, August 1998, http://www.ietf.org/rfc/rfc2396.txt

[RFC2617] Franks, J., Hallam-Baker, P., Hostetler, J., et al., "HTTP Authentication: Basic and Digest Access Authentication", RFC 2617, June 1999, http://www.ietf.org/rfc/rfc2617.txt

[RFC4120] Neuman, C., Yu, T., Hartman, S., and Raeburn, K., "The Kerberos Network Authentication Service (V5)", RFC 4120, July 2005, http://www.ietf.org/rfc/rfc4120.txt

[RFC4559] Jaganathan, K., Zhu, L., and Brezak, J., "SPNEGO-based Kerberos and NTLM HTTP Authentication in Microsoft Windows", RFC 4559, June 2006, http://www.ietf.org/rfc/rfc4559.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

[XML] World Wide Web Consortium, "Extensible Markup Language (XML) 1.0 (Fourth Edition)", W3C Recommendation, August 2006, http://www.w3.org/TR/2006/REC-xml-20060816/

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

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

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

1.2.2 Informative References

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

[MS-INFODCF] Microsoft Corporation, "InfoPath Data Connection File Download Protocol Specification".

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

[NTLM] Microsoft Corporation, "Microsoft NTLM", http://msdn.microsoft.com/en-us/library/aa378749.aspx

If you have any trouble finding [NTLM], please check here.

1.3   Structure Overview (Synopsis)

The Universal Data Connection (UDC) file specifies settings for **data connections (2)** used by **form templates**. Each **Universal Data Connection (.udc, .udcx) file** provides the necessary information to connect to a **data source (1)**. The UDC file is constructed of three main parts:

- Name and description.

- Type and purpose.

- Connection information.

The UDC file is used to provide a layer of indirection for data connection (2) settings so that the settings can be changed for multiple form templates by modifying a single file. In addition, the UDC file allows specification of server-side properties, such as an implementation-specific reference to **authentication (2) credentials** stored in an encrypted database. At runtime, a protocol client retrieves the latest data connection (2) settings from the data connection (2) file and uses them to make the requested data connection (2). A single data connection (2) file provides settings to connect to a single data source (1).

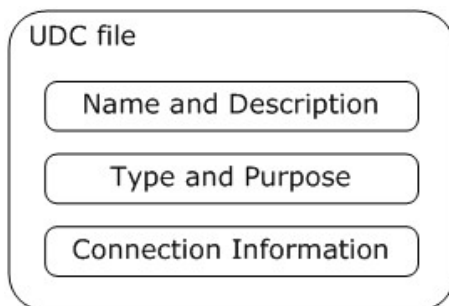The following figure shows the structure of a UDC file.

Figure 1: UDC file structure

1.4   Relationship to Protocols and Other Structures

The UDC file is used by the Forms Service Proxy Web Service Protocol, as described in [MS-FSPP] section 1, to connect to a target **Web service** and optionally use the credentials specified in the UDC file.

A form template uses the information in a UDC file to connect to a data source (1). The InfoPath Data Connection File Download Protocol, as described in [MS-INFODCF] section 1, provides a method for a protocol client that has a form template to request a UDC file.

1.5 Applicability Statement

The UDC file is used to store data connection (2) information outside of a form template. This enables multiple form templates to share the same data connections (2). When a UDC file is used to specify the data connections (2) for a form template, the data connections (2) can be updated without modifying the form template by changing the information in the UDC file.

1.6 Versioning and Localization

This document specifies the Universal Data Connection version 2.0 file format.

1.7 Vendor-Extensible Fields

None.

2 Structures

2.1 Namespaces

This specification specifies and references various **XML namespaces** using the mechanisms specified in [XMLNS] and [RFC2396]. Although this specification associates a specific **XML namespace prefix** for each XML namespace that is used, the choice of any particular XML namespace prefix is implementation-specific and not significant for interoperability.

This specification references the XML namespace prefixes listed in the following table.

Prefix	Namespace URI	Reference
xsd	http://www.w3.org/2001/XMLSchema	[XMLSCHEMA1] [XMLSCHEMA2]
udc	http://schemas.microsoft.com/office/infopath/2006/udc	

2.2 UDC Processing Instructions

The following **XML** processing instruction tag, as specified in [XML] section 2.6, MUST appear in the UDC file:

```
<?MicrosoftWindowsSharePointServices…?>
```

A formal definition in **Augmented Backus-Naur Form (ABNF)**, as specified in [RFC5234], of the XML processing instructions is as follows.

```
UDC_PI = '<?MicrosoftWindowsSharePointServices ' CONTENT_ID_TYPE '?>' CRLF

CONTENT_ID_TYPE = 'ContentTypeID="0x010100B4CBD48E029A4AD8B62CB0E41868F2B0"'
```

2.3 UDC Schema

The following sections specify the elements and attributes of the UDC file.

2.3.1 DataSource

A container for the elements of the UDC file.

Child Elements
ConnectionInfo
Description
Name
Type

Attributes:

MajorVersion: The major version of the UDC file.

MinorVersion: The minor version of the UDC file.

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

```
<xsd:element name="DataSource">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="Name" type="xsd:string"/>
      <xsd:element name="Description" type="xsd:string"/>
      <xsd:element ref="udc:Type"/>
      <xsd:element ref="udc:ConnectionInfo"/>
    </xsd:all>
    <xsd:attribute name="MajorVersion" fixed="2" use="required" type="xsd:int"/>
    <xsd:attribute name="MinorVersion" fixed="0" use="required" type="xsd:int"/>
  </xsd:complexType>
</xsd:element>
```

2.3.2 Name

The name of the UDC file.

Parent Elements
DataSource

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

```
<xsd:element name="Name" type="xsd:string"/>
```

2.3.3 Description

A long description for the UDC file.

Parent Elements
DataSource

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

```
<xsd:element name="Description" type="xsd:string"/>
```

2.3.4 Type

The connection type for the UDC file.

Parent Elements
DataSource

Child Elements
SubType

Attributes:

MajorVersion: The major version of the UDC file. MUST be ignored by the protocol server.

MinorVersion: The minor version of the UDC file. MUST be ignored by the protocol server.

Type: The connection type of the UDC file. MUST be one of the following values:

- SharePointList

- SharePointLibrary

- Database

- XmlQuery

- WebService

- XmlSubmit

- Rest

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

```
<xsd:element name="Type">
  <xsd:complexType>
    <xsd:sequence>
      <xsd:element ref="udc:SubType" minOccurs="0"/>
    </xsd:sequence>
    <xsd:attribute name="MajorVersion" type="xsd:string" use="optional"/>
    <xsd:attribute name="MinorVersion" type="xsd:string" use="optional"/>
    <xsd:attribute name="Type" use="required">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="SharePointList"/>
          <xsd:enumeration value="SharePointLibrary"/>
          <xsd:enumeration value="Database"/>
          <xsd:enumeration value="XmlQuery"/>
          <xsd:enumeration value="WebService"/>
          <xsd:enumeration value="XmlSubmit"/>
          <xsd:enumeration value="Rest"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:attribute>
  </xsd:complexType>
</xsd:element>
```

2.3.5 ConnectionInfo

Contains the information used to establish a connection to a data source (1).

Parent Elements
DataSource

Child Elements
Authentication
SelectCommand
UpdateCommand
WsdlUrl

Attributes:

AltDataSource: A **Uniform Resource Locator (URL)** to another UDC file in the same library. The protocol server MUST NOT support **absolute URLs** for this value. The protocol server MUST use the UDC file specified in this attribute instead of the current UDC file.

Purpose: Determines whether the connection is for a query or submit operation. MUST be one of the following values: "ReadOnly", "WriteOnly", or "ReadWrite". MUST be ignored by the protocol server.

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

```
<xsd:element name="ConnectionInfo">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="WsdlUrl" minOccurs="0" type="xsd:string"/>
      <xsd:element ref="udc:SelectCommand"/>
      <xsd:element ref="udc:UpdateCommand"/>
      <xsd:element ref="udc:Authentication" minOccurs="0"/>
    </xsd:all>
    <xsd:attribute name="Purpose" use="required">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:enumeration value="ReadOnly"/>
          <xsd:enumeration value="WriteOnly"/>
          <xsd:enumeration value="ReadWrite"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:attribute>
    <xsd:attribute name="AltDataSource" type="xsd:string" use="optional"/>
  </xsd:complexType>
</xsd:element>
```

2.3.6   WsdlUrl

When the value of the **Type** attribute of the **Type** element equals "WebService**"**, this element MUST exist and its value MUST be a URL to the **Web Services Description Language (WSDL)** of a Web service where a **Simple Object Access Protocol (SOAP)** query or SOAP submit is executed. The

protocol server MUST support absolute URLs and SHOULD<1> support **server-relative URLs** for this value.

When the value of the **Type** attribute of the **Type** element is not equal to "WebService", the **WsdlUrl** element MUST be ignored by the protocol client and protocol server.

Parent Elements
ConnectionInfo

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

```
<xsd:element name="WsdlUrl" minOccurs="0" type="xsd:string"/>
```

2.3.7   SelectCommand

Contains the information used to query data from a data source (1).

Parent Elements
ConnectionInfo

Child Elements
ConnectionString
ListId
OperationName
Query
ServiceUrl
SoapAction
WebUrl

Attributes:

Type: Reserved for future use. MUST be ignored by the protocol server.

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

```
<xsd:element name="SelectCommand">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="ListId" minOccurs="0" type="xsd:string"/>
      <xsd:element name="WebUrl" minOccurs="0" type="xsd:string"/>
      <xsd:element name="ConnectionString" minOccurs="0" type="xsd:string"/>
      <xsd:element ref="udc:ServiceUrl" minOccurs="0"/>
```

```
            <xsd:element ref="udc:SoapAction" minOccurs="0"/>
            <xsd:element ref="udc:OperationName" minOccurs="0"/>
            <xsd:element name="Query" minOccurs="0" type="xsd:string"/>
        </xsd:all>
        <xsd:attribute name="Type" type="xsd:string" use="optional"/>
    </xsd:complexType>
</xsd:element>
```

2.3.8 ListId

ListId is a unique identifier for a **list (1)** available on the protocol server. When the value of the **Type** attribute of the **Type** element equals "SharePointList**"**, this element and its value MUST exist. Otherwise, it MUST be ignored by the protocol client and protocol server.

Parent Elements
SelectCommand

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

```
<xsd:element name="ListId" minOccurs="0" type="xsd:string"/>
```

2.3.9 WebUrl

When the value of the **Type** attribute of the **Type** element equals "SharePointList", this element MUST exist and its value MUST be a URL to the protocol server that contains the list (1) specified by **ListId**. The protocol server MUST support absolute URLs and SHOULD<2> support server-relative URLs for this value.

When the value of the **Type** attribute of the **Type** element is not equal to "SharePointList", the **WebUrl** element MUST be ignored by the protocol client and protocol server.

Parent Elements
SelectCommand

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

```
<xsd:element name="WebUrl" minOccurs="0" type="xsd:string"/>
```

2.3.10 ConnectionString

A database connection string, as specified in [MS-ADTG] section 2.2.3.13.1, to establish and maintain the connection between the database and the protocol server. When the value of the **Type** attribute of the **Type** element equals "Database**"**, this element and its value MUST exist. Otherwise, it MUST be ignored by the protocol client and protocol server.

Parent Elements

Parent Elements
SelectCommand

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

```
<xsd:element name="ConnectionString" minOccurs="0" type="xsd:string"/>
```

2.3.11   Query

A query or URL. MUST be one of the following:

- If the value of the **Type** attribute of the **Type** element equals "Database", the value of the **Query** element MUST be a **Structured Query Language (SQL)** query that can access and retrieve data from the database specified in the **ConnectionString** element to the protocol server.

- When the value of the **Type** attribute of the **Type** element equals "XmlQuery", the **Query** element MUST exist and its value MUST be a URL to an XML file stored on a Web server that can access and retrieve data from a Web server to the protocol server. The protocol server MUST support absolute URLs and SHOULD<3> support server-relative URLs for this value.

- If the value of the **Type** attribute of the **Type** element equals "Rest", this element MUST exist and its value MUST be an absolute URL to a **Representational State Transfer (REST)** Web service that can access and retrieve data from the Web service to the protocol server.

- Otherwise, this element MUST be ignored by the protocol server.

Parent Elements
SelectCommand

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

```
<xsd:element name="Query" minOccurs="0" type="xsd:string"/>
```

2.3.12   UpdateCommand

Contains the information used to submit data to a data source (1). Section 2.4 specifies which elements are required for each value of the **Type** attribute in the **Type** element.

Parent Elements
ConnectionInfo

Child Elements
FileName

Child Elements
[FolderName](#)
[OperationName](#)
[ServiceUrl](#)
[SoapAction](#)
[Submit](#)

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

```
<xsd:element name="UpdateCommand">
  <xsd:complexType>
    <xsd:all>
      <xsd:element ref="udc:ServiceUrl" minOccurs="0"/>
      <xsd:element ref="udc:SoapAction" minOccurs="0"/>
      <xsd:element ref="udc:OperationName" minOccurs="0"/>
      <xsd:element name="Submit" minOccurs="0" type="xsd:string"/>
      <xsd:element name="FileName" minOccurs="0" type="xsd:string"/>
      <xsd:element ref="udc:FolderName" minOccurs="0"/>
    </xsd:all>
  </xsd:complexType>
</xsd:element>
```

2.3.13   Submit

An absolute URL to a Web server. The Web server MUST be able to accept **HTTP POST** requests with XML in the **message body (1)**. When the value of the **Type** attribute of the **Type** element equals "XmlSubmit", this element and its value MUST exist. Otherwise, it MUST be ignored by the protocol client and protocol server.

Parent Elements
[UpdateCommand](#)

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

```
<xsd:element name="Submit" minOccurs="0" type="xsd:string"/>
```

2.3.14   FileName

The default file name for submitting to a **document library** on a protocol server. MUST be ignored by the protocol server.

Parent Elements
[UpdateCommand](#)

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

```
<xsd:element name="FileName" minOccurs="0" type="xsd:string"/>
```

2.3.15   SoapAction

The name of the method to execute on the **SOAP node** specified in the **ServiceUrl** element for the **SelectCommand** element or the **UpdateCommand** element. When the value of the **Type** attribute of the **Type** element equals "WebService", this element and its value MUST exist. Otherwise, it MUST be ignored by the protocol client and protocol server.

Parent Elements
SelectCommand
UpdateCommand

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

```
<xsd:element name="SoapAction" type="xsd:string"/>
```

2.3.16   OperationName

The name of the **WSDL operation** on a SOAP node specified in the **ServiceUrl** element for the **SelectCommand** element or the **UpdateCommand** element. The protocol server MUST ignore this element.

Parent Elements
SelectCommand
UpdateCommand

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

```
<xsd:element name="OperationName" type="xsd:string"/>
```

2.3.17   FolderName

A URL for the document library hosted on the protocol server. When the value of the **Type** attribute of the **Type** element equals "SharePointLibrary", this element and its value MUST exist. Otherwise, it MUST be ignored by the protocol client and protocol server.

Parent Elements
UpdateCommand

Attributes:

AllowOverwrite: Determines whether a file override is allowed or not. If the value of this attribute is "true" or "1", the protocol server MUST overwrite the content stored in the document library. Otherwise, the protocol server MUST NOT overwrite any content in the document library.

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

```
<xsd:element name="FolderName">
  <xsd:complexType>
    <xsd:simpleContent>
      <xsd:extension base="xsd:string">
        <xsd:attribute name="AllowOverwrite" use="optional">
          <xsd:simpleType>
            <xsd:restriction base="xsd:string">
              <xsd:enumeration value=""/>
              <xsd:enumeration value="0"/>
              <xsd:enumeration value="1"/>
              <xsd:enumeration value="false"/>
              <xsd:enumeration value="true"/>
            </xsd:restriction>
          </xsd:simpleType>
        </xsd:attribute>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
```

2.3.18   ServiceUrl

When the value of the **Type** attribute of the **Type** element equals "WebService", this element MUST exist and its value MUST be a URL for a SOAP node. This URL MUST be used by the SOAP node to execute the SOAP method call specified in the **SoapAction** element. The protocol server MUST support absolute URLs and SHOULD<4> support server-relative URLs for this value.

When the value of the **Type** attribute of the **Type** element is not equal to "WebService", the **ServiceUrl** element MUST be ignored by the protocol client and protocol server.

Parent Elements
SelectCommand
UpdateCommand

Attributes:

UseFormsServiceProxy: Determines whether the connection needs to use the Forms Service Proxy Web service. If the value of this attribute is "true", the protocol server MUST use the Forms Service Proxy Web service, as specified in [MS-FSPP]. Otherwise the protocol server MUST NOT use the Forms Service Proxy Web service.

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

```
<xsd:element name="ServiceUrl">
  <xsd:complexType>
    <xsd:simpleContent>
```

```
      <xsd:extension base="xsd:string">
        <xsd:attribute name="UseFormsServiceProxy" use="optional" type="xsd:boolean"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
</xsd:element>
```

2.3.19 Authentication

Contains authentication (2) information. If the **Authentication** element is present in the **ConnectionInfo** element, the protocol server MUST support both **single sign-on (SSO)** and **explicit authentication** methods, and the protocol server MUST use the provided credentials to authenticate the connections specified by the UDC file as follows:

- If the **SSO** element is present and the **UseExplicit** element is not present in the **Authentication** element, the protocol server MUST use SSO for authentication (2).

- If the **UseExplicit** element is present and the **SSO** element is not present in the **Authentication** element, the protocol server MUST use explicit authentication for authentication (2) with the credentials provided in the **UseExplicit** element.

- If both the **SSO** and the **UseExplicit** elements are present in the **Authentication** element, the protocol server MUST use SSO for authentication (2).

- Otherwise, the protocol server MUST NOT attempt separate authentication (2) to perform the operation specified in the file.

Parent Elements
ConnectionInfo

Child Elements
SSO
UseExplicit

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

```
<xsd:element name="Authentication">
  <xsd:complexType>
    <xsd:all>
      <xsd:element ref="udc:SSO" minOccurs="0"/>
      <xsd:element ref="udc:UseExplicit" minOccurs="0"/>
    </xsd:all>
  </xsd:complexType>
</xsd:element>
```

2.3.20 UseExplicit

UseExplicit contains the credentials for a data source (1) for a protocol server to establish and maintain the data connection (2). If the **UserId** element is not specified, the **Password** element MUST be ignored by the protocol server.

Parent Elements
Authentication

Child Elements
Password
UserId

Attributes:

CredentialType: The method of authentication (2). The possible values for this attribute are specified in section 2.3.24.

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

```
<xsd:element name="UseExplicit">
  <xsd:complexType>
    <xsd:all>
      <xsd:element name="UserId" minOccurs="0" type="xsd:string"/>
      <xsd:element name="Password" minOccurs="0" type="xsd:string"/>
    </xsd:all>
    <xsd:attribute name="CredentialType" use="required"
type="udc:CredentialTypeEnumeration"/>
  </xsd:complexType>
</xsd:element>
```

2.3.21 UserId

The user name for the authentication (2) method specified in section 2.3.19.

Parent Elements
UseExplicit

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

```
<xsd:element name="UserId" minOccurs="0" type="xsd:string"/>
```

2.3.22 Password

The password for the authentication (2) method specified in section 2.3.19.

Parent Elements
UseExplicit

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

```
<xsd:element name="Password" minOccurs="0" type="xsd:string"/>
```

2.3.23   SSO

SSO specifies the SSO authentication (2) method.

Parent Elements
Authentication

Attributes:

AppId: Specifies the application to be used for SSO authentication (2).

CredentialType: Specifies the method of authentication (2).

The possible values for this attribute are specified in section 2.3.24.

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

```
<xsd:element name="SSO">
  <xsd:complexType>
    <xsd:attribute name="AppId" use="required" type="xsd:string"/>
    <xsd:attribute name="CredentialType" use="required"
type="udc:CredentialTypeEnumeration"/>
  </xsd:complexType>
</xsd:element>
```

2.3.24   CredentialTypeEnumeration

CredentialTypeEnumeration specifies how the contained credentials are used. If the **CredentialType** attribute is empty for either the **SSO** or the **UseExplicit** elements, the protocol server MUST ignore both the **SSO** and the **UseExplicit** elements. The protocol server MUST support the credential type specified in this element.

The value of this element MUST be one of the following:

- **Basic:** Credentials are used to perform **Hypertext Transfer Protocol (HTTP)** Basic authentication (2), as specified in [RFC2617].

- **CD:** Credentials are used to impersonate a user using constrained delegation, as specified in [MS-SFU] section 3.1.

- **Digest:** Credentials are used to perform HTTP Digest authentication (2), as specified in [RFC2617].

- **Kerberos**: Credentials are used to impersonate a user using **Kerberos**, as specified in [RFC4120] and [RFC4559].

- **NTLM:** Credentials are used to impersonate a user using Windows challenge/response, as described in [NTLM].

- **SQL:** Credentials are embedded in a database connection string for authentication (2) against a SQL server.

Referenced By
SSO.UniversalDataConnection@CredentialType
UseExplicit.UniversalDataConnection@CredentialType

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

```
<xsd:simpleType name="CredentialTypeEnumeration">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Sql"/>
    <xsd:enumeration value="Ntlm"/>
    <xsd:enumeration value="Kerberos"/>
    <xsd:enumeration value="CD"/>
    <xsd:enumeration value="Basic"/>
    <xsd:enumeration value="Digest"/>
  </xsd:restriction>
</xsd:simpleType>
```

2.3.25 SubType

SubType is reserved for future use. MUST be ignored by the protocol server.

Parent Elements
Type

Attributes:

MajorVersion: Reserved for future use. MUST be ignored by the protocol server.

MinorVersion: Reserved for future use. MUST be ignored by the protocol server.

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

```
<xsd:element name="SubType">
  <xsd:complexType>
    <xsd:attribute name="MajorVersion" type="xsd:string" use="optional"/>
    <xsd:attribute name="MinorVersion" type="xsd:string" use="optional"/>
  </xsd:complexType>
</xsd:element>
```

2.4 Connection Type Requirements

Each UDC file has only one **ConnectionInfo** element. The contents of the **ConnectionInfo** element depend on the value of the **Type** attribute of the **Type** element as specified in the following subsections.

The "udc" prefix used in this section maps to the following namespace:

```
http://schemas.microsoft.com/office/infopath/2006/udc
```

2.4.1 SharePointList Requirements

When the value of the **Type** attribute of the **Type** element equals "SharePointList", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**SharePointList**
udc:DataSource/udc:ConnectionInfo/udc:SelectCommand/udc:ListId	**GUID** of the SharePoint list (1).
udc:DataSource/udc:ConnectionInfo/udc:UpdateCommand/udc:WebUrl	URL to the **site (2)** that contains the list (1).

2.4.2 SharePointLibrary Requirements

When the value of the **Type** attribute of the **Type** element equals "SharePointLibrary", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**SharePointLibrary**
udc:DataSource/udc:ConnectionInfo/udc:UpdateCommand/udc:FolderName	A URL for the document library hosted on the protocol server.
udc:DataSource/udc:ConnectionInfo/udc:UpdateCommand/udc:FolderName/@AllowOverwrite	Determines whether to overwrite a file in a document library if the file already exists.

2.4.3 Database Requirements

When the value of the **Type** attribute of the **Type** element equals "Database", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**Database**

Property	Value description
udc:DataSource/udc:ConnectionInfo/udc:SelectCommand/udc:ConnectionString	Database connection string.
udc:DataSource/udc:ConnectionInfo/udc:SelectCommand/udc:Query	SQL query to execute.

2.4.4   XmlQuery Requirements

When the value of the **Type** attribute of the **Type** element equals "XmlQuery", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**XmlQuery**
udc:DataSource/udc:ConnectionInfo/udc:SelectCommand/udc:Query	URL that specifies the source of the XML to retrieve.

2.4.5   WebService Requirements

When the value of the **Type** attribute of the **Type** element equals "WebService", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**WebService**
udc:DataSource/udc:ConnectionInfo/udc:WsdlUrl	URL to the WSDL for the Web service.
udc:DataSource/udc:ConnectionInfo/udc:UpdateCommand/udc:ServiceUrl	URL to the Web service.
udc:DataSource/udc:ConnectionInfo/udc:UpdateCommand/udc:SoapAction	Web service SOAP action identifier.

2.4.6   XmlSubmit Requirements

When the value of the **Type** attribute of the **Type** element equals "XmlSubmit", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**XmlSubmit**
udc:DataSource/udc:ConnectionInfo/udc:UpdateCommand/udc:Submit	URL that specifies the target of the XML to post.

2.4.7   Rest Requirements

When the value of the **Type** attribute of the **Type** element equals "Rest", the protocol server processes the following properties.

Property	Value description
udc:DataSource/udc:Type/@Type	**Rest**
udc:DataSource/udc:ConnectionInfo/udc:SelectCommand/udc:Query	URL that specifies the source of the REST Web service.

3   Structure Examples

This section contains samples of a UDC file for "Database" and "WebService" data connection (2) types. This section also contains an example of an **Authentication** element when the **CredentialType** attribute is empty.

3.1   Database

The following example is a UDC file that retrieves data from a database. When there are child elements in the **ConnectionInfo** element that are not database-related, the protocol server will only use the database-related elements.

```
<?xml version="1.0" encoding="UTF-8"?>
<?MicrosoftWindowsSharePointServices
ContentTypeID="0x010100B4CBD48E029A4AD8B62CB0E41868F2B0"?>
<udc:DataSource
  MajorVersion="2"
  MinorVersion="0"
  xmlns:udc="http://schemas.microsoft.com/office/infopath/2006/udc">
  <udc:Name>DB Connection</udc:Name>
  <udc:Description>Database</udc:Description>
  <udc:Type MajorVersion="2" MinorVersion="0" Type="Database">
    <udc:SubType MajorVersion="0" MinorVersion="0" Type=""></udc:SubType>
  </udc:Type>
  <udc:ConnectionInfo Purpose="ReadOnly" AltDataSource="">
    <udc:WsdlUrl>http://</udc:WsdlUrl>
    <udc:SelectCommand Type="">
      <udc:ListId></udc:ListId>
      <udc:WebUrl>http://</udc:WebUrl>
      <udc:ConnectionString>Provider=SQLOLEDB.1;Password=MyPassword;Persist Security
Info=True;User ID=MyUserName;Initial Catalog=AdventureWorks;Data Source=testmachine;Use
Procedure for Prepare=1;Auto Translate=True;Packet Size=4096;Workstation ID=MYWORKMACHINE;Use
Encryption for Data=False;Tag with column collation when
possible=False</udc:ConnectionString>
      <udc:OperationName></udc:OperationName>
      <udc:ServiceUrl>http://</udc:ServiceUrl>
      <udc:SoapAction></udc:SoapAction>
      <udc:Query>select
"DocumentID","Title","FileName","FileExtension","Revision","ChangeNumber","Status","DocumentS
ummary","Document","ModifiedDate" from "Production"."Document" as "Document"</udc:Query>
    </udc:SelectCommand>
    <udc:UpdateCommand>
      <udc:OperationName></udc:OperationName>
      <udc:ServiceUrl>http://</udc:ServiceUrl>
      <udc:SoapAction></udc:SoapAction>
      <udc:Submit></udc:Submit>
    </udc:UpdateCommand>
  </udc:ConnectionInfo>
</udc:DataSource>
```

3.2   WebService

The following example is a UDC file that retrieves data from a Web service. When there are child elements in the **ConnectionInfo** element that are not Web service related, the protocol server only uses the Web service related elements.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<?MicrosoftWindowsSharePointServices
ContentTypeID="0x010100B4CBD48E029A4AD8B62CB0E41868F2B0"?>
<udc:DataSource
  MajorVersion="2"
  MinorVersion="0"
  xmlns:udc="http://schemas.microsoft.com/office/infopath/2006/udc">
  <udc:Name>Main query</udc:Name>
  <udc:Description>Format: UDC V2; Connection Type: WebService; Purpose: ReadOnly; Generated
by Microsoft® Office InfoPath® 2007 on 2008-02-12 at 11:23:51.</udc:Description>
  <udc:Type MajorVersion="2" MinorVersion="0" Type="WebService">
    <udc:SubType MajorVersion="0" MinorVersion="0" Type=""/>
  </udc:Type>
  <udc:ConnectionInfo Purpose="ReadOnly" AltDataSource="">
    <udc:WsdlUrl>http://testmachine/app/service.asmx?WSDL</udc:WsdlUrl>
    <udc:SelectCommand>
      <udc:ListId/>
      <udc:WebUrl/>
      <udc:ConnectionString/>
      <udc:ServiceUrl
UseFormsServiceProxy="true">http://testmachine/app/service.asmx</udc:ServiceUrl>
      <udc:SoapAction>http://testmachine/app/HelloWorld</udc:SoapAction>
      <udc:Query/>
    </udc:SelectCommand>
    <udc:UpdateCommand>
      <udc:ServiceUrl UseFormsServiceProxy="false"/>
      <udc:SoapAction/>
      <udc:Submit/>
      <udc:FileName>Specify a filename or formula</udc:FileName>
      <udc:FolderName AllowOverwrite=""/>
    </udc:UpdateCommand>
  </udc:ConnectionInfo>
</udc:DataSource>
```

3.3   Empty Authentication

The following **Authentication** element example shows how the explicit credentials are ignored because the **CredentialType** attribute is empty.

```xml
<udc:Authentication>
  <udc:UseExplicit CredentialType="">
    <udc:UserId>MyUserName</udc:UserId>
    <udc:Password>DatabasePassword</udc:Password>
  </udc:UseExplicit>
</udc:Authentication>
```

4 Security Considerations

The UDC file contains security-sensitive credentials with the provided connection information. If the explicit authentication method is used, the username and password are stored in **plaintext** under the **UseExplicit** element. The preferred authentication (2) method is SSO instead of explicit authentication.

5 Appendix A: Full XML Schemas

For ease of implementation, this section provides the full **XML schema** for the UDC file.

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xsd:schema
  targetNamespace="http://schemas.microsoft.com/office/infopath/2006/udc"
  elementFormDefault="qualified"
  xmlns:udc="http://schemas.microsoft.com/office/infopath/2006/udc"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema">

  <xsd:element name="DataSource" >
    <xsd:complexType >
      <xsd:all>
        <xsd:element name="Name" type="xsd:string" />
        <xsd:element name="Description" type="xsd:string" />
        <xsd:element ref="udc:Type" />
        <xsd:element ref="udc:ConnectionInfo" />
      </xsd:all>
      <xsd:attribute name="MajorVersion" fixed="2" use="required" type="xsd:int" />
      <xsd:attribute name="MinorVersion" fixed="0" use="required" type="xsd:int" />
    </xsd:complexType>
  </xsd:element>

  <xsd:element name="Type" >
    <xsd:complexType >
      <xsd:sequence>
        <xsd:element ref="udc:SubType" minOccurs="0" />
      </xsd:sequence>
      <xsd:attribute name="MajorVersion" type="xsd:string" use="optional" />
      <xsd:attribute name="MinorVersion" type="xsd:string" use="optional" />
      <xsd:attribute name="Type" use="required" >
        <xsd:simpleType >
          <xsd:restriction base="xsd:string">
            <xsd:enumeration value="SharePointList" />
            <xsd:enumeration value="SharePointLibrary" />
            <xsd:enumeration value="Database" />
            <xsd:enumeration value="XmlQuery" />
            <xsd:enumeration value="WebService" />
            <xsd:enumeration value="XmlSubmit" />
            <xsd:enumeration value="Rest" />
          </xsd:restriction>
        </xsd:simpleType>
      </xsd:attribute>
    </xsd:complexType>
  </xsd:element>

  <xsd:element name="ConnectionInfo" >
    <xsd:complexType >
      <xsd:all>
        <xsd:element name="WsdlUrl" minOccurs="0" type="xsd:string" />
        <xsd:element ref="udc:SelectCommand" />
        <xsd:element ref="udc:UpdateCommand" />
        <xsd:element ref="udc:Authentication" minOccurs="0" />
      </xsd:all>
      <xsd:attribute name="Purpose" use="required" >
        <xsd:simpleType >
          <xsd:restriction base="xsd:string">
```

```
                    <xsd:enumeration value="ReadOnly" />
                    <xsd:enumeration value="WriteOnly" />
                    <xsd:enumeration value="ReadWrite" />
                </xsd:restriction>
            </xsd:simpleType>
        </xsd:attribute>
        <xsd:attribute name="AltDataSource" type="xsd:string" use="optional" />
    </xsd:complexType>
</xsd:element>

<xsd:element name="SelectCommand" >
    <xsd:complexType >
        <xsd:all>
            <xsd:element name="ListId" minOccurs="0" type="xsd:string" />
            <xsd:element name="WebUrl" minOccurs="0" type="xsd:string" />
            <xsd:element name="ConnectionString" minOccurs="0" type="xsd:string" />
            <xsd:element ref="udc:ServiceUrl" minOccurs="0" />
            <xsd:element ref="udc:SoapAction" minOccurs="0" />
            <xsd:element ref="udc:OperationName" minOccurs="0" />
            <xsd:element name="Query" minOccurs="0" type="xsd:string" />
        </xsd:all>
        <xsd:attribute name="Type" type="xsd:string" use="optional" />
    </xsd:complexType>
</xsd:element>

<xsd:element name="UpdateCommand" >
    <xsd:complexType >
        <xsd:all>
            <xsd:element ref="udc:ServiceUrl" minOccurs="0" />
            <xsd:element ref="udc:SoapAction" minOccurs="0" />
            <xsd:element ref="udc:OperationName" minOccurs="0" />
            <xsd:element name="Submit" minOccurs="0" type="xsd:string" />
            <xsd:element name="FileName" minOccurs="0" type="xsd:string" />
            <xsd:element ref="udc:FolderName" minOccurs="0" />
        </xsd:all>
    </xsd:complexType>
</xsd:element>

<xsd:element name="SoapAction" type="xsd:string" />

<xsd:element name="OperationName" type="xsd:string" />

<xsd:element name="FolderName" >
    <xsd:complexType >
        <xsd:simpleContent>
            <xsd:extension base="xsd:string">
                <xsd:attribute name="AllowOverwrite" use="optional" >
                    <xsd:simpleType>
                        <xsd:restriction base="xsd:string">
                            <xsd:enumeration value="" />
                            <xsd:enumeration value="0" />
                            <xsd:enumeration value="1" />
                            <xsd:enumeration value="false" />
                            <xsd:enumeration value="true" />
                        </xsd:restriction>
                    </xsd:simpleType>
                </xsd:attribute>
            </xsd:extension>
        </xsd:simpleContent>
```

```xsd
      </xsd:complexType>
    </xsd:element>


    <xsd:element name="ServiceUrl" >
      <xsd:complexType >
        <xsd:simpleContent>
          <xsd:extension base="xsd:string">
            <xsd:attribute name="UseFormsServiceProxy" use="optional" type="xsd:boolean" />
          </xsd:extension>
        </xsd:simpleContent>
      </xsd:complexType>
    </xsd:element>

    <xsd:element name="Authentication" >
      <xsd:complexType >
        <xsd:all>
          <xsd:element ref="udc:SSO" minOccurs="0" />
          <xsd:element ref="udc:UseExplicit" minOccurs="0" />
        </xsd:all>
      </xsd:complexType>
    </xsd:element>

    <xsd:element name="UseExplicit" >
      <xsd:complexType >
        <xsd:all>
          <xsd:element name="UserId" minOccurs="0" type="xsd:string" />
          <xsd:element name="Password" minOccurs="0" type="xsd:string" />
        </xsd:all>
        <xsd:attribute name="CredentialType" use="required"
type="udc:CredentialTypeEnumeration" />
      </xsd:complexType>
    </xsd:element>

    <xsd:element name="SSO" >
      <xsd:complexType >
        <xsd:attribute name="AppId" use="required" type="xsd:string" />
        <xsd:attribute name="CredentialType" use="required"
type="udc:CredentialTypeEnumeration" />
      </xsd:complexType>
    </xsd:element>

    <xsd:simpleType name="CredentialTypeEnumeration" >
      <xsd:restriction base="xsd:string">
        <xsd:enumeration value="Sql" />
        <xsd:enumeration value="Ntlm" />
        <xsd:enumeration value="Kerberos" />
        <xsd:enumeration value="CD" />
        <xsd:enumeration value="Basic" />
        <xsd:enumeration value="Digest" />
      </xsd:restriction>
    </xsd:simpleType>

    <xsd:element name ="SubType" >
      <xsd:complexType >
        <xsd:attribute name="MajorVersion" type="xsd:string" use="optional" />
        <xsd:attribute name="MinorVersion" type="xsd:string" use="optional" />
      </xsd:complexType>
    </xsd:element>
```

```
</xsd:schema>
```

```
</xsd: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® Office InfoPath® 2007

- Microsoft® InfoPath® 2010

- Microsoft® InfoPath® 2013

- Microsoft® Office SharePoint® Server 2007

- Microsoft® SharePoint® Server 2010

- Microsoft® SharePoint® Server 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 2.3.6: Office InfoPath 2007, Office Forms Server 2007, Office Enterprise 2007 do not support server-relative URLs for the value of the WsdlUrl element.

<2> Section 2.3.9: Office InfoPath 2007, Office Forms Server 2007, Office Enterprise 2007 do not support server-relative URLs for the value of the **WebUrl** element.

<3> Section 2.3.11: Office InfoPath 2007, Office Forms Server 2007, Office Enterprise 2007 do not support server-relative URLs for the value of the **Query** element.

<4> Section 2.3.18: Office InfoPath 2007, Office Forms Server 2007, Office Enterprise 2007 do not support server-relative URLs for the value of the **ServiceUrl** element.

7 Change Tracking

No table of changes is available. The document is either new or has had no changes since its last release.

8   Index