

## [MS-AXL2]:

# Access Application Transfer Protocol Structure Version 2

---

### Intellectual Property Rights Notice for Open Specifications Documentation

- **Technical Documentation.** Microsoft publishes Open Specifications documentation for protocols, file formats, languages, standards as well as overviews of the interaction among each of these technologies.
- **Copyrights.** This documentation is covered by Microsoft copyrights. Regardless of any other terms that are contained in the terms of use for the Microsoft website that hosts this documentation, you may make copies of it in order to develop implementations of the technologies described in the Open Specifications and may distribute portions of it in your implementations using these technologies or your documentation as necessary to properly document the implementation. You may also distribute in your implementation, with or without modification, any schema, IDL's, or code samples that are included in the documentation. This permission also applies to any documents that are referenced in the Open Specifications.
- **No Trade Secrets.** Microsoft does not claim any trade secret rights in this documentation.
- **Patents.** Microsoft has patents that may cover your implementations of the technologies described in the Open Specifications. Neither this notice nor Microsoft's delivery of the documentation grants any licenses under those or any other Microsoft patents. However, a given Open Specification may be covered by Microsoft [Open Specification Promise](#) or the [Community Promise](#). If you would prefer a written license, or if the technologies described in the Open Specifications are not covered by the Open Specifications Promise or Community Promise, as applicable, patent licenses are available by contacting [iplg@microsoft.com](mailto:iplg@microsoft.com).
- **Trademarks.** The names of companies and products contained in this documentation may be covered by trademarks or similar intellectual property rights. This notice does not grant any licenses under those rights. For a list of Microsoft trademarks, visit [www.microsoft.com/trademarks](http://www.microsoft.com/trademarks).
- **Fictitious Names.** The example companies, organizations, products, domain names, e-mail addresses, logos, people, places, and events depicted in this documentation are fictitious. No association with any real company, organization, product, domain name, email address, logo, person, place, or event is intended or should be inferred.

**Reservation of Rights.** All other rights are reserved, and this notice does not grant any rights other than specifically described above, whether by implication, estoppel, or otherwise.

**Tools.** The Open Specifications do not require the use of Microsoft programming tools or programming environments in order for you to develop an implementation. If you have access to Microsoft programming tools and environments you are free to take advantage of them. Certain Open Specifications are intended for use in conjunction with publicly available standard specifications and network programming art, and assumes that the reader either is familiar with the aforementioned material or has immediate access to it.

## Revision Summary

Date	Revision History	Revision Class	Comments
1/20/2012	0.1	New	Released new document.
4/11/2012	0.1	None	No changes to the meaning, language, or formatting of the technical content.
7/16/2012	0.1	None	No changes to the meaning, language, or formatting of the technical content.
9/12/2012	0.1	None	No changes to the meaning, language, or formatting of the technical content.
10/8/2012	1.0	Major	Significantly changed the technical content.
2/11/2013	2.0	Major	Significantly changed the technical content.
7/30/2013	2.0	None	No changes to the meaning, language, or formatting of the technical content.
11/18/2013	2.0	None	No changes to the meaning, language, or formatting of the technical content.
2/10/2014	2.0	None	No changes to the meaning, language, or formatting of the technical content.
4/30/2014	2.1	Minor	Clarified the meaning of the technical content.
7/31/2014	2.1	None	No changes to the meaning, language, or formatting of the technical content.
10/30/2014	2.1	None	No changes to the meaning, language, or formatting of the technical content.
2/26/2016	3.0	Major	Significantly changed the technical content.

# Table of Contents

<b>1</b>	<b>Introduction .....</b>	<b>8</b>
1.1	Glossary .....	8
1.2	References .....	9
1.2.1	Normative References .....	9
1.2.2	Informative References .....	10
1.3	Overview .....	10
1.3.1	Tables .....	10
1.3.1.1	Check Constraints .....	10
1.3.1.2	Default Constraints .....	10
1.3.1.3	Indexes .....	11
1.3.1.4	Unique Constraints .....	11
1.3.1.5	Annotation Elements and Attributes .....	11
1.3.2	UI Macros .....	11
1.3.3	Data Macros .....	11
1.3.4	Queries .....	12
1.4	Relationship to Protocols and Other Structures .....	12
1.5	Applicability Statement .....	12
1.6	Versioning and Localization .....	13
1.7	Vendor-Extensible Fields .....	13
<b>2</b>	<b>Structures .....</b>	<b>14</b>
2.1	Conceptual Overview .....	14
2.1.1	Tables .....	14
2.1.1.1	Check Constraints .....	14
2.1.1.2	Default Constraints .....	14
2.1.1.3	Indexes .....	14
2.1.1.4	Unique Constraints .....	14
2.1.1.5	Annotation Elements and Attributes .....	15
2.1.1.6	Linked Tables .....	16
2.1.2	Macros .....	16
2.1.2.1	User Interface Macros .....	17
2.1.2.2	Data Macros .....	17
2.1.2.3	Variables .....	17
2.1.2.3.1	User Interface Macro Variables .....	17
2.1.2.3.2	Local Variables .....	17
2.1.2.3.3	Return Variables .....	17
2.1.3	Queries .....	17
2.1.3.1	Aggregate Expression .....	18
2.1.4	Ignored Value .....	18
2.2	AXL2 .....	19
2.2.1	Elements .....	19
2.2.1.1	Query .....	19
2.2.1.2	Ordering .....	19
2.2.1.3	UserInterfaceMacros .....	19
2.2.1.4	DataMacros .....	19
2.2.1.5	UserInterfaceMacro .....	20
2.2.1.6	CheckConstraint .....	20
2.2.1.7	DefaultConstraint .....	20
2.2.1.8	Index .....	20
2.2.1.9	Unique .....	21
2.2.1.10	Expression .....	21
2.2.1.11	EventDataMacro .....	21
2.2.1.12	FormDef .....	22
2.2.1.13	ExtendedAttributes .....	22
2.2.1.14	DataMacro .....	22

2.2.1.15	PropertyRef .....	22
2.2.2	Attributes .....	23
2.2.2.1	SiteURL .....	23
2.2.2.2	InternalName .....	23
2.2.2.3	TextType .....	23
2.2.2.4	UnderlyingType.....	23
2.2.2.5	BoundColumn .....	24
2.2.2.6	Caption.....	24
2.2.2.7	CurrencySymbol .....	24
2.2.2.8	Description.....	24
2.2.2.9	Direction.....	25
2.2.2.10	DisplayColumn.....	25
2.2.2.11	DisplayName .....	25
2.2.2.12	DisplayOrder .....	25
2.2.2.13	Format .....	26
2.2.2.14	LookupType.....	26
2.2.2.15	ObjectId .....	26
2.2.2.16	ReferencedTable .....	26
2.2.2.17	StoreGeneratedPattern .....	27
2.2.2.18	Values .....	27
2.2.2.19	CurrencyLocale .....	27
2.2.2.20	DecimalPlaces.....	27
2.2.2.21	AllowMultipleValues.....	28
2.2.2.22	Image .....	28
2.2.2.23	Udt .....	28
2.2.3	Complex Types.....	29
2.2.3.1	CT_Expression .....	29
2.2.3.2	CT_Order .....	29
2.2.3.3	CT_Ordering.....	30
2.2.3.4	CT_AdHocOrder .....	30
2.2.3.5	CT_AdHocOrdering .....	31
2.2.3.6	CT_Reference .....	31
2.2.3.7	CT_References.....	32
2.2.3.8	CT_Result .....	32
2.2.3.9	CT_Results.....	34
2.2.3.10	CT_Join .....	34
2.2.3.11	CT_Joins .....	35
2.2.3.12	CT_Parameter .....	35
2.2.3.13	CT_Parameters .....	36
2.2.3.14	CT_ParameterDefinition .....	36
2.2.3.15	CT_ParameterDefinitions.....	37
2.2.3.16	CT_ParameterValue.....	37
2.2.3.17	CT_ParameterValues .....	38
2.2.3.18	CT_Query .....	38
2.2.3.19	CT_Argument .....	39
2.2.3.20	CT_Action .....	40
2.2.3.21	CT_ForEachRecordData.....	41
2.2.3.22	CT_ForEachRecord .....	41
2.2.3.23	CT_LookupRecordData.....	42
2.2.3.24	CT_LookupRecord .....	43
2.2.3.25	CT_CreateRecordData .....	43
2.2.3.26	CT_CreateRecord .....	44
2.2.3.27	CT_EditRecordData .....	44
2.2.3.28	CT_EditRecord .....	45
2.2.3.29	CT_UserInterfaceIf.....	45
2.2.3.30	CT_UserInterfaceElseIf .....	46
2.2.3.31	CT_UserInterfaceElse .....	47
2.2.3.32	CT_DataIf .....	47

2.2.3.33	CT_DataElseIf.....	48
2.2.3.34	CT_DataElse.....	48
2.2.3.35	CT_UserInterfaceConditionalBlock.....	49
2.2.3.36	CT_DataConditionalBlock.....	49
2.2.3.37	CT_UserInterfaceMacroStatements.....	50
2.2.3.38	CT_DataMacroStatements.....	51
2.2.3.39	CT_UserInterfaceMacroStatementGroup.....	52
2.2.3.40	CT_DataMacroStatementGroup.....	52
2.2.3.41	CT_UserInterfaceMacros.....	53
2.2.3.42	CT_DataMacros.....	53
2.2.3.43	CT_UserInterfaceMacro.....	54
2.2.3.44	CT_DataMacro.....	54
2.2.3.45	CT_ExpressionContents.....	55
2.2.3.46	CT_FunctionCall.....	56
2.2.3.47	CT_Identifier.....	60
2.2.3.48	CT_IntegerLiteral.....	60
2.2.3.49	CT_NullLiteral.....	60
2.2.3.50	CT_StringLiteral.....	61
2.2.3.51	CT_DateTimeLiteral.....	61
2.2.3.52	CT_TimeLiteral.....	61
2.2.3.53	CT_DateLiteral.....	62
2.2.3.54	CT_BitLiteral.....	62
2.2.3.55	CT_IndexedFunctionCall.....	62
2.2.3.56	CT_IndexedIdentifier.....	66
2.2.3.57	CT_IndexedIntegerLiteral.....	66
2.2.3.58	CT_IndexedNullLiteral.....	67
2.2.3.59	CT_IndexedStringLiteral.....	67
2.2.3.60	CT_IndexedDatePartLiteral.....	68
2.2.3.61	CT_IndexedTypeLiteral.....	68
2.2.3.62	CT_IndexedDateTimeLiteral.....	69
2.2.3.63	CT_IndexedTimeLiteral.....	69
2.2.3.64	CT_IndexedDateLiteral.....	70
2.2.3.65	CT_IndexedBitLiteral.....	70
2.2.3.66	CT_Index.....	71
2.2.3.67	CT_Unique.....	71
2.2.3.68	CT_ConstraintWithExpression.....	72
2.2.3.69	CT_CheckConstraint.....	72
2.2.3.70	CT_DefaultConstraint.....	73
2.2.3.71	CT_OrderExpression.....	74
2.2.3.72	CT_Group.....	74
2.2.3.73	CT_GroupExpression.....	75
2.2.3.74	CT_Groups.....	75
2.2.3.75	CT_OutputParameter.....	76
2.2.3.76	CT_TopRows.....	76
2.2.3.77	CT_TopPercent.....	77
2.2.3.78	CT_ExpressionArgument.....	77
2.2.3.79	CT_Expressions.....	78
2.2.3.80	CT_EventDataMacro.....	78
2.2.3.81	CT_FormDef.....	79
2.2.3.82	CT_ExtendedAttribute.....	79
2.2.3.83	CT_ExtendedAttributes.....	80
2.2.3.84	CT_DecimalLiteral.....	80
2.2.3.85	CT_IndexedDecimalLiteral.....	81
2.2.3.86	CT_NamedExpression.....	81
2.2.3.87	CT_PropertyRef.....	82
2.2.3.88	CT_PropertyRefIndex.....	82
2.2.4	Simple Types.....	83
2.2.4.1	ST_ObjectName.....	83

2.2.4.2	ST_DataObjectEvent .....	83
2.2.4.3	ST_ShortString .....	84
2.2.4.4	ST_LongString .....	84
2.2.4.5	ST_JoinDirection .....	85
2.2.4.6	ST_FieldType .....	85
2.2.4.7	ST_SortDirection .....	86
2.2.4.8	ST_TextType .....	87
2.2.4.9	TStoreGeneratedPattern .....	88
2.2.4.10	ST_LookupType .....	88
2.2.4.11	ST_Percent .....	89
2.2.4.12	ST_UserInterfaceObjectEvent .....	89
2.2.4.13	ST_Format .....	90
2.2.4.14	ST_Decimal .....	91
2.2.4.15	ST_DatePartLiteral .....	92
2.2.4.16	ST_TypeLiteral .....	93
2.2.4.17	ST_DecimalPlaces .....	93
2.2.4.18	ST_QuerySourceType .....	94
2.2.5	Macros .....	94
2.2.5.1	Actions .....	94
2.2.5.1.1	ChangeView .....	94
2.2.5.1.2	CancelRecordChange .....	95
2.2.5.1.3	ClosePopup .....	95
2.2.5.1.4	DeleteRecord .....	95
2.2.5.1.5	EditRecord .....	95
2.2.5.1.6	ExitForEachRecord .....	95
2.2.5.1.7	GoToControl .....	96
2.2.5.1.8	GoToRecord .....	96
2.2.5.1.9	MessageBox .....	96
2.2.5.1.10	OpenPopup .....	96
2.2.5.1.11	RaiseError .....	97
2.2.5.1.12	RequeryRecords .....	97
2.2.5.1.13	RunDataMacro .....	97
2.2.5.1.14	RunMacro .....	98
2.2.5.1.15	SaveRecord .....	98
2.2.5.1.16	SetField .....	98
2.2.5.1.17	SetLocalVar .....	98
2.2.5.1.18	SetProperty .....	99
2.2.5.1.19	SetReturnVar .....	99
2.2.5.1.20	SetVariable .....	99
2.2.5.1.21	StopMacro .....	100
2.2.5.2	Arguments .....	100
2.2.5.2.1	Alias .....	100
2.2.5.2.2	ControlName .....	100
2.2.5.2.3	Description .....	100
2.2.5.2.4	Field .....	100
2.2.5.2.5	Table .....	100
2.2.5.2.6	View .....	100
2.2.5.2.7	MacroName .....	101
2.2.5.2.8	Message .....	101
2.2.5.2.9	Name .....	101
2.2.5.2.10	Variable .....	101
2.2.5.2.11	OrderBy .....	101
2.2.5.2.12	Property .....	101
2.2.5.2.13	Record .....	102
2.2.5.2.14	Value .....	102
2.2.5.2.15	Where .....	102
<b>3</b>	<b>Structure Examples .....</b>	<b>103</b>

3.1	Tables .....	103
3.2	Forms.....	105
3.3	UI Macros .....	105
3.3.1	Validation and Exceptions .....	106
3.3.2	Standalone .....	106
3.4	Data Macros .....	107
3.4.1	Validate Delete.....	107
3.4.2	After Insert.....	108
3.4.3	Named Macro .....	109
3.5	Queries.....	110
3.5.1	Single Reference Query .....	110
3.5.2	Multiple Reference Query with Join .....	111
<b>4</b>	<b>Security.....</b>	<b>113</b>
4.1	Security Considerations for Implementers .....	113
4.2	Index of Security Fields .....	113
<b>5</b>	<b>Appendix A: Full XML Schema.....</b>	<b>114</b>
5.1	<a href="http://schemas.microsoft.com/office/accessservices/2010/12/application">http://schemas.microsoft.com/office/accessservices/2010/12/application</a> Schema ..	114
<b>6</b>	<b>Appendix B: Product Behavior .....</b>	<b>127</b>
<b>7</b>	<b>Change Tracking.....</b>	<b>128</b>
<b>8</b>	<b>Index.....</b>	<b>130</b>

# 1 Introduction

The Access Application Transfer Protocol Structure Version 2 specification, a revision of [\[MS-AXL\]](#), specifies structures that can be used to describe data application components. This version includes structures for layout descriptions of data views; workflow control; combining, filtering and ordering of data; and metadata describing the entire database application.

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

## 1.1 Glossary

This document uses the following terms:

**alias:** An alternate name that can be used to reference an object or element.

**Boolean:** An operation or expression that can be evaluated only as either true or false.

**calculated column:** A **column** in a table that contains a formula that is copied automatically to each record in the column.

**caption:** One or more characters that can be used as a label for display purposes or as an identifier.

**column:** See **field**.

**control:** A graphical user interface object that users interact with when working with applications, forms, documents, webpages, and other types of files.

**data macro:** A component that implements application logic and enables recognition of built-in actions and tasks for list items.

**data source:** A database, web service, disk, file, or other collection of information from which data is queried or submitted. Supported data sources vary based on application and data provider.

**data type:** A property of a field that defines the kind of data that is stored in the field, or defines the kind of data returned by an expression when the expression is evaluated.

**database application:** A set of objects, including tables, queries, forms, reports, macros, and code modules, that are stored in a database structure.

**database object:** An object such as a table, query, form, report, macro, or module that can be referenced by name in a database, database application, or database project.

**display name:** A text string that is used to identify a principal or other object in the user interface. Also referred to as title.

**email address:** A string that identifies a user and enables the user to receive Internet messages.

**expression:** A combination of operators, symbols, constants, literal values, functions, names of fields or **columns**, controls, and properties that evaluates to a single value.

**field:** A discrete unit of a record that has a name, a data type, and a value.

**filter:** A mechanism by which a set of data is scoped to display only those entries that meet specified logical criteria.

**floating-point number:** A number that is represented by a mantissa and an exponent according to a given base. The mantissa is typically a value between "0" and "1". To find the value of a



floating-point number, the base is raised to the power of the exponent, and the mantissa is multiplied by the result.

**form:** A structured document with controls and spaces that are reserved for entering and displaying information. Forms can contain special coding for actions such as submitting and querying data.

**hyperlink:** A relationship between two anchors, as described in [\[RFC1866\]](#).

**Hypertext Markup Language (HTML):** An application of the Standard Generalized Markup Language (SGML) that uses tags to mark elements in a document, as described in [\[HTML\]](#).

**input source:** A table, view, query, or schema diagram that is used as a data source for a query.

**lookup field:** A field of the Lookup type that enables users to select an item from another data source.

**query:** A formalized instruction to a data source to either extract data or perform a specified action. A query can be in the form of a query expression, a method-based query, or a combination of the two. The data source can be in different forms, such as a relational database, XML document, or in-memory object. See also search query.

**record:** A group of related **fields**, which are sometimes referred to as columns, of information that are treated as a unit. Also referred to as row.

**row:** A collection of **columns** that contains property values that describe a single item in a set of items that match the restriction (1) specified in a query.

**session:** A representation of application data in system memory. It is used to maintain state for application data that is being manipulated or monitored on a protocol server by a user.

**site:** A group of related webpages that is hosted by a server on the World Wide Web or an intranet. Each website has its own entry points, metadata, administration settings, and workflows. Also referred to as web site.

**sort order:** The order in which the rows in a Table object are requested to appear. This can involve sorting on multiple properties and sorting of categories (5).

**Uniform Resource Locator (URL):** A string of characters in a standardized format that identifies a document or resource on the World Wide Web. The format is as specified in [\[RFC1738\]](#).

**XML:** The Extensible Markup Language, as described in [\[XML1.0\]](#).

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

## 1.2 References

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

### 1.2.1 Normative References

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

[MC-CSDL] Microsoft Corporation, "[Conceptual Schema Definition File Format](#)".

[MSDN-TSQL-Ref] Microsoft Corporation, "Transact-SQL Reference", SQL Server 2005 Books Online (November 2008), [http://msdn.microsoft.com/en-us/library/ms189826\(SQL.90\).aspx](http://msdn.microsoft.com/en-us/library/ms189826(SQL.90).aspx)

[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>

[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/>

[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/>

[XML] World Wide Web Consortium, "Extensible Markup Language (XML) 1.0 (Fourth Edition)", W3C Recommendation 16 August 2006, edited in place 29 September 2006, <http://www.w3.org/TR/2006/REC-xml-20060816/>

## 1.2.2 Informative References

[MS-AADT] Microsoft Corporation, "[Access Application Design Time Protocol](#)".

[MS-ADR] Microsoft Corporation, "[Access Services Data Run Time Protocol](#)".

[MS-AXL] Microsoft Corporation, "[Access Application Transfer Protocol Structure Specification](#)".

[MS-SSDL] Microsoft Corporation, "[Store Schema Definition Language File Format](#)".

## 1.3 Overview

The structures specified by this protocol can be used to define objects in a **database application** such as constraints and indexes on a table, application variables, user interface command routines, data manipulation routines, and **queries**.

This protocol follows XML formatting and does not specify how to contain data or data schemas.

### 1.3.1 Tables

A table in a database application is a data structure that organizes data as **rows** and **columns**. This protocol defines structures and annotation attributes to describe constraints, indexes and other properties on a table.

This protocol does not support describing certain properties of a table schema, such as columns and relationships. However, this protocol can be used in conjunction with other protocols such as the Conceptual Schema Definition File Format ([\[MC-CSDL\]](#)) or the Store Schema Definition Language File Format ([\[MS-SSDL\]](#)) for describing a complete table schema.

#### 1.3.1.1 Check Constraints

A check constraint is a validation condition for data being added or updated in a table. This protocol allows check constraints to be specified on a table or on a single column. This protocol specifies check constraints by using the **CheckConstraint** element (section [2.2.1.6](#)).

#### 1.3.1.2 Default Constraints

A default constraint on a column specifies a value that the column will take when no value is explicitly assigned to it during the addition of a data row. This protocol specifies default constraints by using the **DefaultConstraint** element (section [2.2.1.7](#)).

### 1.3.1.3 Indexes

An index defined on one or more columns provides faster retrieval of data based on the values within those columns. This protocol specifies indexes by using the **Index** element (section [2.2.1.8](#)).

### 1.3.1.4 Unique Constraints

A unique constraint on a column enforces uniqueness of its data by not allowing duplicate values in the column. This protocol specifies unique constraints by using the **Unique** element (section [2.2.1.9](#)).

### 1.3.1.5 Annotation Elements and Attributes

This protocol specifies several annotation element and attribute types (section [2.1.1.5](#)) that can be used with other protocols, such as the Conceptual Schema Definition File Format ([\[MC-CSDL\]](#)), to describe properties of a table schema.

The [\[MS-AADT\]](#) protocol, for example, uses the annotation elements and attributes in the [\[MC-CSDL\]](#) protocol to define a table schema, as described by section 2.1.1.5.

## 1.3.2 UI Macros

User Interface (UI) Macros are command routines that respond to user interaction and change the state of the UI. They can be used to perform a variety of actions, including navigating among **forms**, validating and verifying user input, and filtering records that are shown in the forms. Important features of UI Macros include **expressions**, **filters**, and the ability to implement conditional logic. A UI Macro can exist as a standalone object with a name or as an embedded macro that is part of a form. Macros that are part of a form are triggered by events that occur on the form or on a control on the form.

An example of application logic is the use of UI Macros to respond to user input in a search field. After the user modifies the contents of a search box and navigates to a different control, a UI Macro can be triggered that applies a filter to a list of items, such as a list box or a subform, which limits the records displayed in the list to those containing the search term.

Another example is the use of UI Macros to implement navigation functionality, such as drill-through behavior on a form. After an item in a list box is double-clicked, a UI Macro can be triggered that launches a new form, which displays details of the selected item, such as information from a related **data source**.

This protocol specifies UI Macros using the **CT\_UserInterfaceMacro** type (section [2.2.3.43](#)). Both embedded and standalone UI Macros can specify a **Statements** element, which specifies commands that will be performed when the Macro is run. Embedded Macros also specify the **Event** attribute, which specifies when the Macro will be triggered, and the optional **For** attribute if the Macro will be triggered by the event of a control on the form, as opposed to an event of the form itself.

## 1.3.3 Data Macros

**Data Macros** represent data validation logic, product logic and business logic in a data application. Data Macros allow a data application to perform a series of actions based on a given set of conditions. They can exist as a standalone named object, or be associated with an event in a Table (section [1.3.1](#)).

An example of validation logic is the use of a Data Macro (section [2.1.2.2](#)) to ensure that a value entered into a column makes sense given other values in the Table (section 1.3.1). After a value is entered into the **EndDate** field of a **record**, a Data Macro (section 2.1.2.2) can be triggered to ensure that the value of that field is later than the value of the **StartDate** field in the same record, or else the record will not be updated.

Another example is the use of a Data Macro (section 2.1.2.2) to keep the value of a field in one Table (section 1.3.1) updated based on entries in another Table (section 1.3.1). When a new item is created in a Projects table, a Data Macro (section 2.1.2.2) can be triggered to increment the **TotalProjectCount** field in the separate Managers table, so that each record in the Managers table always has an up-to-date count of the total number of projects assigned to that manager.

Data Macros (section 2.1.2.2) in this protocol are specified by the **CT\_DataMacro** type (section [2.2.3.44](#)). All Data Macros (section 2.1.2.2) can specify a **Statements** child element which specifies the commands that will be performed when the Macro is called. Data Macro (section 2.1.2.2) associated with a Table (section 1.3.1) event specify the **Event** attribute, which specifies when the Macro will be triggered. Named Data Macro (section 2.1.2.2) can specify a **Parameters** child element which specifies the names and data types of passed-in parameters.

### 1.3.4 Queries

Queries are used in a database application for combining, filtering, sorting and grouping of data. Queries can reduce the load on a system by returning only the subset of information that is relevant to a process or an end user.

This structure specifies queries using the **Query** (section [2.2.1.1](#)) element. Queries specified in this structure are similar to SQL SELECT statements and support:

- Projection: Limiting the results to a subset of the columns in the underlying data source.
- Ordering: Sorting the results on a combination of one or more columns and expressions.
- Restriction: Limiting the results to certain records, based on data in the record.
- Joins: Creating a new result set from the combination of multiple data sources.
- Top Results: Limiting the results to return the first specified number or percentage of records.
- Distinct Results: Limiting the results to return unique rows.
- Grouping: Describing the groups into which records will be placed in the result set.
- Group Restriction: Limiting the results to certain groups of records, based on data in the group of records.

## 1.4 Relationship to Protocols and Other Structures

This structure is designed to be used as part of a communication protocol with a server. The [\[MS-AADT\]](#) protocol and the [\[MS-ADR\]](#) protocol both use this structure for parts of their structure content.

This structure can be used in conjunction with the Conceptual Schema Definition File Format ([\[MC-CSDL\]](#)) or the Store Schema Definition Language File Format ([\[MS-SSDL\]](#)) for describing a complete table schema, as described in section [1.3.1](#).

## 1.5 Applicability Statement

This protocol is applicable for use as a standalone or a supporting representation and for publishing to a server a database application, which can include structures and actions to control workflow, the combining, filtering and ordering of data, and metadata to describe the database application as a whole.

This format provides interoperability with applications that create or read documents conforming to this structure.

## **1.6 Versioning and Localization**

None.

## **1.7 Vendor-Extensible Fields**

This structure is an open schema. Authors of a database application can extend and comment this structure with their own attributes and sub-elements as long as they are in their own namespace. Note, however, that implementations that use this structure are not required to preserve unrecognized elements when loading and persisting.

## 2 Structures

### 2.1 Conceptual Overview

This section specifies the concepts used by structures that conform to this protocol's schema (section [5.1](#)).

#### 2.1.1 Tables

A table in a database application is a data structure that organizes data as rows and columns. A table schema defines a table in terms of its columns and other properties such as constraints and relationships.

This protocol defines elements and types that can be used to describe properties of a table schema such as check constraints, default constraints, indexes, and unique constraints.

This protocol also defines annotation elements and attributes that are used in conjunction with the Conceptual Schema Definition File Format ([\[MC-CSDL\]](#)) to describe other table schema properties such as columns and relationships.

##### 2.1.1.1 Check Constraints

A check constraint specifies a validation condition that **MUST** be satisfied for data to be added or updated in a table. A check constraint can be defined either as a table-wide constraint or on a specific column in the table. When a check constraint is added to a table, the constraint can optionally be tested on existing data. A check constraint can also optionally specify a message to be displayed to the user when the data violates the validation condition.

This protocol defines the **CheckConstraint** element (section [2.2.1.6](#)) for specifying a check constraint.

##### 2.1.1.2 Default Constraints

A default constraint on a column in a table specifies a default value that is used when a new row is inserted and no value was specified for that column.

This protocol defines the **DefaultConstraint** element (section [2.2.1.7](#)) for specifying a default constraint.

##### 2.1.1.3 Indexes

An index defined on one or more columns in a table provides faster retrieval of data for searching, sorting and filtering based on the values in those columns. Indexes use a **sort order** for each column involved in the index, which specifies the order in which the column data is indexed.

This protocol defines the **Index** element (section [2.2.1.8](#)) for specifying an index on one or more columns (1) in a table in which the columns (1) can have duplicate values.

##### 2.1.1.4 Unique Constraints

A unique constraint on a column enforces uniqueness of its data by creating an index (section [2.1.1.3](#)) on that column and disallowing duplicate values in that column. Unique constraints use a sort order to determine the order in which the column data is indexed.

This protocol defines the **Unique** element (section [2.2.1.9](#)) for specifying a unique constraint on a column in a table.

### 2.1.1.5 Annotation Elements and Attributes

This protocol defines annotation elements and attributes that are to be used in conjunction with the Conceptual Schema Definition File Format ([MC-CSDL]) to fully describe a table schema (section [2.1.1](#)), including table schema properties such as columns and relationships.

The following table specifies the different annotation elements for this protocol and their usage with the structures defined in the Conceptual Schema Definition File Format ([MC-CSDL]).

Element	Usage
<b>Expression</b> (section <a href="#">2.2.1.10</a> )	MUST be used as a child of the <b>Property</b> element ([MC-CSDL] section <a href="#">2.1.3</a> ), only for <b>calculated columns</b> .
<b>ExtendedAttributes</b> (section <a href="#">2.2.1.13</a> )	If present, MUST be a child of the <b>Property</b> element ([MC-CSDL] section 2.1.3) to specify additional properties of the column, or a child of the <b>EntityType</b> element ([MC-CSDL] section <a href="#">2.1.2</a> ) to specify additional properties of the table.

The following table specifies the different annotation attributes for this protocol and their usage with the structures defined in the Conceptual Schema Definition File Format ([MC-CSDL]). If present, each attribute MUST be used as an attribute of the **Property** element ([MC-CSDL] section 2.1.3) to define the corresponding column. In addition, the **ObjectId** attribute (section [2.2.2.16](#)) can be used as an attribute of the **Association** element ([MC-CSDL] section [2.1.8](#)).

Attribute	Usage
<b>BoundColumn</b> (section <a href="#">2.2.2.5</a> )	MUST be used only for a <b>lookup field</b> .
<b>Caption</b> (section <a href="#">2.2.2.6</a> )	MAY be used for any column.
<b>CurrencyLocale</b> (section <a href="#">2.2.2.19</a> )	MUST be used only for a column that contains currency data.
<b>CurrencySymbol</b> (section <a href="#">2.2.2.7</a> )	MUST be used only for a column that contains currency data.
<b>DecimalPlaces</b> (section <a href="#">2.2.2.20</a> )	MUST be used only for a column that contains numeric data.
<b>Description</b> (section <a href="#">2.2.2.8</a> )	MAY be used for any column.
<b>Direction</b> (section <a href="#">2.2.2.9</a> )	MUST be used only for a lookup field.
<b>DisplayColumn</b> (section <a href="#">2.2.2.10</a> )	MUST be used only for a lookup field.
<b>DisplayName</b> (section <a href="#">2.2.2.11</a> )	MUST be used for all columns.
<b>DisplayOrder</b> (section <a href="#">2.2.2.12</a> )	MAY be used for any column.
<b>Format</b> (section <a href="#">2.2.2.13</a> )	MAY be used for any column.
<b>LookupType</b> (section <a href="#">2.2.2.14</a> )	MUST be used only for a lookup field.

Attribute	Usage
<a href="#">2.2.2.15</a> )	
<b>ObjectId</b> (section <a href="#">2.2.2.16</a> )	MAY be used for any column or an <b>Association</b> element ([MC-CSDL] section <a href="#">2.1.8</a> ).
<b>ReferencedTable</b> (section <a href="#">2.2.2.17</a> )	MUST be used only for a lookup field.
<b>StoreGeneratedPattern</b> (section <a href="#">2.2.2.18</a> )	MUST be used only for a calculated column or for an identity column.
<b>TextType</b> (section <a href="#">2.2.2.3</a> )	MUST be used only for a column that contains text data, including <b>hyperlinks</b> .
<b>UnderlyingType</b> (section <a href="#">2.2.2.4</a> )	MUST be used only for a column that contains date or date with time data.
<b>Values</b> (section <a href="#">2.2.2.19</a> )	MUST be used only for a lookup field.

### 2.1.1.6 Linked Tables

Linked tables are tables in a database application whose table structure alone is stored in the back-end database while the table data is stored in an external location.

The schema of a linked table can also be described using the annotation elements and attributes of this protocol in conjunction with the Conceptual Schema Definition File Format ([MC-CSDL]) as specified in section [2.1.1.5](#). However, this protocol defines additional mandatory annotation attributes that are used exclusively for describing the schema of a linked table.

The following table specifies the different annotation attributes for this protocol and their usage with the structures defined in the Conceptual Schema Definition File Format ([MC-CSDL]) for describing a linked table.

Attribute	Usage
<b>InternalName</b> (section <a href="#">2.2.2.2</a> )	MUST be used as an attribute of the <b>EntityType</b> element ([MC-CSDL] section <a href="#">2.1.2</a> ) and as an attribute of the <b>Property</b> element ([MC-CSDL] section <a href="#">2.1.3</a> ) to specify the corresponding internal names of the linked table and its columns respectively.
<b>SiteUrl</b> (section <a href="#">2.2.2.1</a> )	MUST be used as an attribute of the <b>EntityType</b> element ([MC-CSDL] section <a href="#">2.1.2</a> ) to specify the source of the linked table.

In addition, the **ObjectId** attribute (section [2.2.2.16](#)) can be used as an attribute of the **Association** element ([MC-CSDL] section [2.1.8](#)).

### 2.1.2 Macros

A Macro is a set of logical constructs that control the flow of the Macro and commands that are performed when the Macro is called. Each command in the Macro is specified by an action (section [2.2.5.1](#)) and zero or more arguments (section [2.2.5.2](#)) that modify the meaning of the action. A Macro is called by an object in the application.



A named Macro, that is, a Macro that specifies a name, exists as a **database object** in the Application. Objects that reference a Macro can specify either the name of a named Macro or a list of inline commands. Macro commands that are specified inline in an object specify an embedded Macro.

Macros are run in one of two contexts, as specified in the next two sections.

### 2.1.2.1 User Interface Macros

The commands of a User Interface Macro are performed at the level of the graphical user interface of the application. If a User Interface Macro encounters any error during runtime, then the Macro will stop running.

### 2.1.2.2 Data Macros

The commands of a Data Macro are performed at the level of the data of the application. If a Data Macro encounters any error during runtime, including the ones raised by the **RaiseError** action (section [2.2.5.1.11](#)), then the Macro will stop and rollback, as if no commands in the Macro had been performed.

There are two kinds of Data Macros. A Named Data Macro is a standalone database object with the name specified, and it is explicitly called through the **RunDataMacro** action (section [2.2.5.1.13](#)). An Event Data Macro is embedded in a Table (section [2.1.1](#)), and it is triggered once a specified data event occurs on the table.

### 2.1.2.3 Variables

Macros can reference the following types of variables.

#### 2.1.2.3.1 User Interface Macro Variables

User Interface Macro variables are identified by name. They can be referenced by any User Interface Macro or any control in the database application. A User Interface Macro variable is created when the first **SetVariable** action (section [2.2.5.1.20](#)) that references its name is performed and exists until the end of the application **session**. These variables are not used in Data Macros.

#### 2.1.2.3.2 Local Variables

Local variables are identified by name. They can be referenced only by the Macro that created them. A local variable is created when the first **SetLocalVar** action (section [2.2.5.1.17](#)) that references its name is performed and exists until the Macro that created it has finished running. These variables are not used in User Interface Macros.

#### 2.1.2.3.3 Return Variables

Return variables are identified by name. A return variable is created when the first **SetReturnVar** action (section [2.2.5.1.19](#)) that references its name is performed, and it is available only in a standalone Named Data Macro (section [2.1.2.2](#)). It exists until the standalone Named Data Macro has finished running. The value of a return variable is available to the caller of the Named Data Macro.

## 2.1.3 Queries

A Query in this protocol defines a way to build a query to be used as an object in a database application. It is a subset of the functionality defined by the SELECT statement in Transact-SQL ([\[MSDN-TSQL-Ref\]](#)).

A Query can be used to filter, order or group data. It can also be used to bring together data from more than one **input source**. Queries can take input in the form of parameters, which can be

included in the output columns as part of an expression or used to filter the query results. Queries can use expressions in output columns, in restrictions, in groupings, in orderings or in group restrictions to perform calculations or formatting on data. Queries can also group data and filter these groups according to the data in those groups.

Queries include components that map to the following clauses of a SELECT statement as expressed by Transact-SQL ([MSDN-TSQL-Ref]). Restrictions on what is permitted for each Query component are described in the linked sections in this document.

Transact-SQL Clause	Query AXL
SELECT	<b>Results</b> (section <a href="#">2.2.3.9</a> ) and <b>Parameters</b> (section <a href="#">2.2.3.13</a> )
DISTINCT	<b>Distinct</b> attribute of <b>Query</b> (section <a href="#">2.2.3.18</a> )
TOP	<b>Top Rows</b> (section <a href="#">2.2.3.76</a> ) and <b>Top Percent</b> (section <a href="#">2.2.3.77</a> )
FROM	<b>References</b> (section <a href="#">2.2.3.7</a> ) and <b>Joins</b> (section <a href="#">2.2.3.11</a> )
WHERE	<b>Restriction</b> child element of <b>Query</b> (section <a href="#">2.2.3.18</a> )
GROUP BY	<b>Groups</b> (section <a href="#">2.2.3.74</a> )
HAVING	<b>GroupRestriction</b> child element of <b>Query</b> (section <a href="#">2.2.3.18</a> )
ORDER BY	<b>Ordering</b> (section <a href="#">2.2.3.3</a> )

### 2.1.3.1 Aggregate Expression

Aggregate expressions perform a calculation on a set of values and return a single value. An aggregate expression uses an aggregate function, which is a **CT\_FunctionCall** element (section [2.2.3.46](#)) whose **Name** attribute has one of the following values:

Function Name
Avg
Count
Max
Min
StDev
Sum
Var

If a **CT\_ExpressionContents** element (section [2.2.3.45](#)) has at least one descendant that is an aggregate function, then the **CT\_ExpressionContents** element is an aggregate expression.

### 2.1.4 Ignored Value

An attribute that can have any value as long as the document remains well-formed ([\[XML\]](#) section 2). [<1>](#)

## 2.2 AXL2

### 2.2.1 Elements

#### 2.2.1.1 Query

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_Query** (section [2.2.3.18](#)) element that specifies one Query (section [2.1.3](#)) to be used as an object in a database application.

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

```
<xsd:element name="Query" type="CT_Query" wblid:cname="Query"/>
```

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

#### 2.2.1.2 Ordering

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_AdHocOrdering** (section [2.2.3.5](#)) element that specifies the ordering applied to the records displayed in the form.

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

```
<xsd:element name="Ordering" type="CT_AdHocOrdering" wblid:cname="Ordering"/>
```

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

#### 2.2.1.3 UserInterfaceMacros

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_UserInterfaceMacros** (section [2.2.3.41](#)) element that specifies one or more **User Interface Macros** (section [2.1.2.1](#)) used by a database application.

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

```
<xsd:element name="UserInterfaceMacros" wblid:cname="UserInterfaceMacros" type="CT_UserInterfaceMacros"/>
```

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

#### 2.2.1.4 DataMacros

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_DataMacros** (section [2.2.3.42](#)) element that specifies one or more Data Macros (section [2.1.2.2](#)).

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

```
<xsd:element name="DataMacros" wblld:cname="DataMacros" type="CT_DataMacros"/>
```

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

### 2.2.1.5 UserInterfaceMacro

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_UserInterfaceMacro](#) element that specifies a single **User Interface Macros** (section [2.1.2.1](#)).

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

```
<xsd:element name="UserInterfaceMacro" wblld:cname="UserInterfaceMacro" type="CT_UserInterfaceMacro"/>
```

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

### 2.2.1.6 CheckConstraint

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_CheckConstraint](#) (section [2.2.3.69](#)) element that specifies a Check Constraint (section [2.1.1.1](#)) in a Table (section [2.1.1](#)).

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

```
<xsd:element name="CheckConstraint" wblld:cname="CheckConstraint" type="CT_CheckConstraint"/>
```

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

### 2.2.1.7 DefaultConstraint

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_DefaultConstraint](#) (section [2.2.3.70](#)) element that specifies a Default Constraint (section [2.1.1.2](#)) in a Table (section [2.1.1](#)).

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

```
<xsd:element name="DefaultConstraint" wblld:cname="DefaultConstraint" type="CT_DefaultConstraint"/>
```

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

### 2.2.1.8 Index

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_Index** (section [2.2.3.66](#)) element that specifies an Index (section [2.1.1.3](#)) in the Table (section [2.1.1](#)).

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

```
<xsd:element name="Index" wblld:cname="Index" type="CT_Index"/>
```

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

### 2.2.1.9 Unique

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_Unique** (section [2.2.3.67](#)) element that specifies a Unique Constraint (section [2.1.1.4](#)) in a Table (section [2.1.1](#)).

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

```
<xsd:element name="Unique" wblld:cname="Unique" type="CT_Unique"/>
```

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

### 2.2.1.10 Expression

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies an expression.

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

```
<xsd:element name="Expression" type="CT_ExpressionContents" wblld:cname="Expression"/>
```

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

### 2.2.1.11 EventDataMacro

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **CT\_EventDataMacro** (section [2.2.3.80](#)) element that specifies an Event Data Macro (section [2.1.2.2](#)) on a Table (section [2.1.1](#)).

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

```
<xsd:element name="EventDataMacro" wblld:cname="EventDataMacro" type="CT_EventDataMacro"/>
```

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

### 2.2.1.12 FormDef

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_FormDef](#) element that specifies a form (section [1.3.2](#)).

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

```
<xsd:element name="FormDef" wblld:cname="FormDef" type="CT_FormDef"/>
```

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

### 2.2.1.13 ExtendedAttributes

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_ExtendedAttributes](#) (section [2.2.3.83](#)) element that specifies additional properties of a column or table as name/value pairs.

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

```
<xsd:element name="ExtendedAttributes" wblld:cname="ExtendedAttributes" type="CT_ExtendedAttributes"/>
```

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

### 2.2.1.14 DataMacro

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_DataMacro](#) (section [2.2.3.44](#)) element that specifies a Data Macro (section [2.1.2.2](#)).

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

```
<xsd:element name="DataMacro" wblld:cname="DataMacro" type="CT_DataMacro"/>
```

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

### 2.2.1.15 PropertyRef

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A [CT\\_PropertyRef](#) element (section [2.2.3.87](#)) that specifies a reference to a column in a table (section [2.1.1](#)).

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

```
<xsd:element name="PropertyRef" wblld:cname="PropertyRef" type="CT_PropertyRef"/>
```

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

## 2.2.2 Attributes

### 2.2.2.1 SiteURL

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **anyURI** ([\[XMLSCHEMA2\]](#) section 3.2.17) attribute that specifies the **Uniform Resource Locator (URL)** of a **site** that is the source of a linked table (section [2.1.1.6](#)).

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

```
<xsd:attribute name="SiteURL" wbl:d:cname="SiteURL" type="xsd:anyURI"/>
```

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

### 2.2.2.2 InternalName

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of a linked table (section [2.1.1.6](#)) or the name of a **field** in a linked table (section [2.1.1.6](#)).

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

```
<xsd:attribute name="InternalName" wbl:d:cname="InternalName" type="ST_ObjectName"/>
```

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

### 2.2.2.3 TextType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_TextType** (section [2.2.4.8](#)) attribute that specifies the layout or format of a column that stores text.

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

```
<xsd:attribute name="TextType" wbl:d:cname="TextType" type="ST_TextType"/>
```

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

### 2.2.2.4 UnderlyingType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_FieldType** (section [2.2.4.6](#)) attribute that specifies whether the underlying data type for a column of type Date/Time is Date or Date/Time.

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

```
<xsd:attribute name="UnderlyingType" wblld:cname="UnderlyingType" type="ST_FieldType"/>
```

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

### 2.2.2.5 BoundColumn

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the column in the data source of a lookup field that contains the data stored in the lookup field.

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

```
<xsd:attribute name="BoundColumn" wblld:cname="BoundColumn" type="ST_ObjectName"/>
```

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

### 2.2.2.6 Caption

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_LongString** attribute (section [2.2.4.4](#)) that specifies a **caption** or display name.

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

```
<xsd:attribute name="Caption" type="ST_LongString" wblld:cname="Caption"/>
```

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

### 2.2.2.7 CurrencySymbol

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies a currency symbol.

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

```
<xsd:attribute name="CurrencySymbol" wblld:cname="CurrencySymbol" type="xsd:string"/>
```

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

### 2.2.2.8 Description

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies a description of a column.

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



```
<xsd:attribute name="Description" wblld:cname="Description" type="xsd:string"/>
```

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

### 2.2.2.9 Direction

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_SortDirection** attribute (section [2.2.4.7](#)) that specifies an ordering in a sort operation.

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

```
<xsd:attribute name="Direction" wblld:cname="Direction" type="ST_SortDirection"/>
```

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

### 2.2.2.10 DisplayColumn

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the column in the data source of a lookup field that contains the data displayed by controls that are bound to the lookup field.

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

```
<xsd:attribute name="DisplayColumn" wblld:cname="DisplayColumn" type="ST_ObjectName"/>
```

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

### 2.2.2.11 DisplayName

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the **display name** for a column.

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

```
<xsd:attribute name="DisplayName" wblld:cname="DisplayName" type="ST_ObjectName"/>
```

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

### 2.2.2.12 DisplayOrder

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **unsignedLong** ([\[XMLSCHEMA1\]](#) section 3.3.21) attribute that specifies the index in the display order in which this column is normally displayed.

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

```
<xsd:attribute name="DisplayOrder" wblid:cname="DisplayOrder" type="xsd:unsignedLong"/>
```

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

### 2.2.2.13 Format

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_Format** attribute (section [2.2.4.13](#)) that specifies a format for displaying a column value.

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

```
<xsd:attribute name="Format" wblid:cname="Format" type="ST_Format"/>
```

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

### 2.2.2.14 LookupType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_LookupType** attribute (section [2.2.4.10](#)) that specifies the type of data source for a lookup field.

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

```
<xsd:attribute name="LookupType" wblid:cname="LookupType" type="ST_LookupType"/>
```

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

### 2.2.2.15 ObjectId

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies an identifier for an object.

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

```
<xsd:attribute name="ObjectId" wblid:cname="ObjectId" type="ST_ObjectName"/>
```

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

### 2.2.2.16 ReferencedTable

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the table name that contains the source column for a lookup field.

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

```
<xsd:attribute name="ReferencedTable" wblid:cname="ReferencedTable" type="ST_ObjectName"/>
```

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

### 2.2.2.17 StoreGeneratedPattern

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **TStoreGeneratedPattern** attribute (section [2.2.4.9](#)) that specifies the data generation pattern for a column.

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

```
<xsd:attribute name="StoreGeneratedPattern" wblid:cname="StoreGeneratedPattern" type="TStoreGeneratedPattern"/>
```

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

### 2.2.2.18 Values

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies a list of items that are the source values for a lookup field. Each value **MUST** be enclosed in double quotes and separated from the next value by a semicolon.

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

```
<xsd:attribute name="Values" wblid:cname="Values" type="xsd:string"/>
```

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

### 2.2.2.19 CurrencyLocale

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies a locale for formatting a currency value, which is defined by a language identifier and a region identifier.

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

```
<xsd:attribute name="CurrencyLocale" wblid:cname="CurrencyLocale" type="xsd:string"/>
```

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

### 2.2.2.20 DecimalPlaces

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

An **ST\_DecimalPlaces** (section [2.2.4.17](#)) attribute that specifies the number of decimal places used to display a column value.

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

```
<xsd:attribute name="DecimalPlaces" type="ST_DecimalPlaces" wbl:d:cname="DecimalPlaces"/>
```

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

### 2.2.2.21 AllowMultipleValues

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **boolean** ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute that specifies whether a column allows multiple values.

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

```
<xsd:attribute name="AllowMultipleValues" wbl:d:cname="AllowMultipleValues" type="xsd:boolean"/>
```

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

### 2.2.2.22 Image

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

A **boolean** ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute that specifies whether the column contains image data.

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

```
<xsd:attribute name="Image" wbl:d:cname="Image" type="xsd:boolean"/>
```

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

### 2.2.2.23 Udt

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

MUST NOT be used.

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

```
<xsd:attribute name="Udt" wbl:d:cname="Udt" type="xsd:string"/>
```

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

## 2.2.3 Complex Types

### 2.2.3.1 CT\_Expression

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#), [CT\\_ForEachRecordData](#), [CT\\_LookupRecordData](#), [CT\\_DataIf](#), [CT\\_DataElseIf](#), [CT\\_UserInterfaceIf](#), [CT\\_UserInterfaceElseIf](#)

Specifies a single expression.

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies the expression.

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

```
<xsd:complexType name="CT_Expression">
  <xsd:sequence>
    <xsd:element name="Expression" type="CT_ExpressionContents" wblid:cname="Expression"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.2 CT\_Order

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Ordering](#)

Specifies a single order to apply to a **CT\_Query** (section [2.2.3.18](#)).

*Attributes:*

**Direction:** An **ST\_SortDirection** (section [2.2.4.7](#)) attribute that specifies the direction of the order.

**Name:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies one column from the input source specified by the **Source** attribute. The column **MUST** be included in the **CT\_Results** element (section [2.2.3.9](#)) of the parent **CT\_Query** (section [2.2.3.18](#)). If the **CT\_Result** (section [2.2.3.8](#)) element specifying the column has an **Alias** attribute, then this attribute **MUST** have that value. The data from that column is ordered in the query **CT\_Results** according to **Direction**.

**Source:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name or alias of one of the input sources to the query. The input source **MUST** be listed in the **CT\_References** (section [2.2.3.7](#)) collection of the parent **CT\_Query** (section [2.2.3.18](#)). If the **CT\_Reference** (section [2.2.3.6](#)) element specifying the input source has an **Alias** attribute, then this attribute **MUST** have that value.

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

```
<xsd:complexType name="CT_Order">
  <xsd:attribute name="Name" type="ST_LongString" use="required" wblid:cname="Name"/>
  <xsd:attribute name="Source" type="ST_ObjectName" use="required" wblid:cname="Source"/>
  <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.3 CT\_Ordering

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Container type for all of the ordering specified in a **CT\_Query** (section 2.2.3.18). MUST contain at least one and no more than 255 **Order** or **OrderExpression** elements. The final query results are ordered such that the first listed **Order** or **OrderExpression** takes precedence across the entire result set, with the second listed **Order** or **OrderExpression** affecting the arrangement of rows within the limits imposed by the first ordering, and so on.

*Child Elements:*

**Order:** A **CT\_Order** (section [2.2.3.2](#)) element that specifies one column from the **CT\_Results** (section [2.2.3.9](#)) of the query and a direction. Query results are sorted on that column in the given direction.

**OrderExpression:** A **CT\_OrderExpression** (section [2.2.3.71](#)) element that specifies an expression and a direction. Query results are sorted by the value of that expression for each row in the given direction.

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

```
<xsd:complexType name="CT_Ordering">
  <xsd:choice maxOccurs="255">
    <xsd:element name="Order" wblid:cname="Order" type="CT_Order"/>
    <xsd:element name="OrderExpression" wblid:cname="OrderExpression"
type="CT_OrderExpression"/>
  </xsd:choice>
</xsd:complexType>
```

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

### 2.2.3.4 CT\_AdHocOrder

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_AdHocOrdering](#)

Specifies one column to order.

*Attributes:*

**Direction:** An **ST\_SortDirection** (section [2.2.4.7](#)) attribute that specifies the sort order as either ascending or descending.

**Name:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies the column to which the order is applied.

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

```
<xsd:complexType name="CT_AdHocOrder">
  <xsd:attribute name="Name" type="ST_LongString" use="required" wblid:cname="Name"/>
</xsd:complexType>
```

```

    <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
    wblid:cname="Direction" use="optional"/>
  </xsd:complexType>

```

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

### 2.2.3.5 CT\_AdHocOrdering

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [Ordering](#)

The **CT\_AdHocOrdering** complex type is a container type for the **CT\_AdHocOrder** (section [2.2.3.4](#)) and **CT\_OrderExpression** (section [2.2.3.71](#)) elements. Elements of this type MUST contain at least one and no more than 255 **Order** or **OrderExpression** elements.

*Child Elements:*

**Order:** A **CT\_AdHocOrder** element that specifies one column, and a direction to order.

**OrderExpression:** A **CT\_OrderExpression** element that specifies an expression, and a direction to order.

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

```

<xsd:complexType name="CT_AdHocOrdering">
  <xsd:choice maxOccurs="255">
    <xsd:element name="Order" wblid:cname="Order" type="CT_AdHocOrder"/>
    <xsd:element name="OrderExpression" wblid:cname="OrderExpression"
    type="CT_OrderExpression"/>
  </xsd:choice>
</xsd:complexType>

```

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

### 2.2.3.6 CT\_Reference

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_References](#)

Specifies one input source to the parent **CT\_Query** (section [2.2.3.18](#)).

*Child Elements:*

**ReferenceParameters:** A **CT\_Parameters** element (section [2.2.3.13](#)) that specifies parameters of the input source. If a **CT\_Parameter** (section [2.2.3.12](#)) specified in this element has the same **Name** attribute as a **CT\_Parameter** in the **Parameters** element of the parent **CT\_Query** (section [2.2.3.18](#)) or in the **ReferenceParameters** element of a different **CT\_Reference** in the same parent **CT\_Query**, their **Type** attributes MUST be the same.

If the parent **CT\_Query** is used as an input source to another query, the parameters in **CT\_Query** and the parameters in **ReferenceParameters** in order of input sources MUST be listed in **ReferenceParameters** of the **References** element in another query. While adding the **ReferenceParameters** of input sources to the list, the parameter MUST be skipped if a **CT\_Parameter** with the same **Name** has already been added.

*Attributes:*

**Alias:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies an alias for the input source. This alias **MUST** be used throughout the Query object to refer to the input source as if it had been named this alias. The value **MUST** be unique among all **Alias** attribute values under the **CT\_References** collection (section 2.2.3.7).

**Source:** An **ST\_ObjectName** attribute that specifies a table or a named query (section [2.1.3](#)) that contains data included in the query **CT\_Results** (section [2.2.3.9](#)).

**Type:** An **ST\_QuerySourceType** attribute (section [2.2.4.18](#)) that specifies the type of the input source.

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

```
<xsd:complexType name="CT_Reference">
  <xsd:all>
    <xsd:element name="ReferenceParameters" minOccurs="0" type="CT_Parameters"
    wblid:cname="ReferenceParameters"/>
  </xsd:all>
  <xsd:attribute name="Source" type="ST_ObjectName" use="required" wblid:cname="Source"/>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
  <xsd:attribute name="Type" type="ST_QuerySourceType" default="Table" wblid:cname="Type"
  use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.7 CT\_References

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Container type for the input sources to a **CT\_Query** (section 2.2.3.18). **MUST** contain one or more **Reference** elements.

*Child Elements:*

**Reference:** A **CT\_Reference** (section [2.2.3.6](#)) element that specifies a Table (section [2.1.1](#)) or Query (section [2.1.3](#)) that is an input source to the **CT\_Query** (section 2.2.3.18).

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

```
<xsd:complexType name="CT_References">
  <xsd:sequence>
    <xsd:element name="Reference" minOccurs="0" maxOccurs="unbounded" wblid:cname="Reference"
    type="CT_Reference"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.8 CT\_Result

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>



Referenced by: [CT\\_Results](#)

Specifies one or more columns of data to be included in the **CT\_Results** (section 2.2.3.9) of a **CT\_Query** (section [2.2.3.18](#)).

The specification is for one column of data from a single input source (that is, the **All** attribute is false and the **Name** and **Source** attributes are present), all columns from a single input source (that is, **All** is true and **Source** is present), all columns from all input sources (that is, **All** is true and **Source** is not present), or a single expression (that is, an **Expression** child element is present).

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies a single expression to be included in the query results. The expression **MUST** be evaluated per row in the results. This element **MUST NOT** be present if the **Source** or **Name** attribute is present or if the **All** attribute is true. When this attribute is present, the **Alias** attribute **MUST** also be present.

*Attributes:*

**Alias:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies an **alias** for a column in the query results. This attribute **MUST NOT** be present if the **All** attribute is set to true. This attribute **MUST** be present if an **Expression** child element is present. The value **MUST** be unique among all **Alias** attribute values under the **CT\_Results** (section 2.2.3.9) collection.

If the same single column of data is specified by more than one **Result** element in a **CT\_Results** (section 2.2.3.9) collection, not including **Result** elements where the **All** attribute is true, then either all or all but one **Result** element that specifies the column by including both a **Source** attribute and a **Name** attribute **MUST** have an **Alias** attribute present.

**All:** A boolean ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute. If this attribute is true and the **Source** attribute is present, then the query results contain all columns from the input source indicated by the **Source** attribute. If this attribute is true and the **Source** attribute is not present, then the query results contain all columns from all input sources listed in the **CT\_References** (section [2.2.3.7](#)) collection. When this attribute is true, the **Expression** child element, the **Name** attribute, and the **Alias** attribute **MUST NOT** be present.

**Name:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies the name of one column from the input source specified by the **Source** attribute. The data from this column is included in the query results. This attribute **MUST NOT** be present if the **All** attribute is set to true or if an **Expression** child element is present.

**Source:** An **ST\_ObjectName** (section 2.2.4.1) attribute that specifies the name or alias of one of the input sources to the query. This attribute **MUST NOT** be present if an **Expression** child element is present. The input source **MUST** be listed in the **CT\_References** (section 2.2.3.7) collection of the query. If the **CT\_Reference** (section [2.2.3.6](#)) element specifying the input source contains an **Alias** value, then this attribute **MUST** be that value.

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

```
<xsd:complexType name="CT_Result">
  <xsd:all>
    <xsd:element name="Expression" type="CT_ExpressionContents" minOccurs="0"
wblid:cname="Expression"/>
  </xsd:all>
  <xsd:attribute name="Source" type="ST_ObjectName" wblid:cname="Source" use="optional"/>
  <xsd:attribute name="Name" type="ST_LongString" wblid:cname="Name" use="optional"/>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
  <xsd:attribute name="All" type="xsd:boolean" default="false" wblid:cname="All"
use="optional"/>
</xsd:complexType>
```

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

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

### 2.2.3.9 CT\_Results

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Container element for the results in a **CT\_Query** (section 2.2.3.18). MUST include at least one and no more than 255 **Property** elements.

*Child Elements:*

**Property:** A **CT\_Result** (section [2.2.3.8](#)) element that specifies one or more columns of data to include in the **CT\_Query** (section 2.2.3.18) results.

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

```
<xsd:complexType name="CT_Results">
  <xsd:sequence>
    <xsd:element name="Property" maxOccurs="255" wld:cname="Property" type="CT_Result"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.10 CT\_Join

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT Joins](#)

Description of a single join in a **CT\_Query** (section [2.2.3.18](#)). A join MUST NOT have the same pair of **Left** and **Right** attribute values as another join in the same **CT\_Query** (section 2.2.3.18).

*Attributes:*

**Left:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the left input source. The input source MUST be listed in the **CT\_References** (section [2.2.3.7](#)) collection of the parent **CT\_Query** element (section 2.2.3.18). If the **CT\_Reference** element (section [2.2.3.6](#)) that specifies the left input source specifies an **Alias** attribute, then this attribute MUST be that value.

**LeftProperty:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies the column in the left input source on which to join.

**Right:** An **ST\_ObjectName** (section 2.2.4.1) attribute that specifies the right input source. The input source MUST be listed in the **CT\_References** (section 2.2.3.7) collection of the parent **CT\_Query** element (section 2.2.3.18). If the **CT\_Reference** element (section 2.2.3.6) that specifies the right input source includes an **Alias** attribute, then this attribute MUST be that value.

**RightProperty:** An **ST\_LongString** (section 2.2.4.4) attribute that specifies the column in the right input source on which to join.

**Type:** An **ST\_JoinDirection** (section [2.2.4.5](#)) attribute that specifies the direction of the join.

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

```
<xsd:complexType name="CT_Join">
  <xsd:attribute name="Left" type="ST_ObjectName" use="required" wblid:cname="Left"/>
  <xsd:attribute name="Right" type="ST_ObjectName" use="required" wblid:cname="Right"/>
  <xsd:attribute name="LeftProperty" type="ST_LongString" use="required"
wblid:cname="LeftProperty"/>
  <xsd:attribute name="RightProperty" type="ST_LongString" use="required"
wblid:cname="RightProperty"/>
  <xsd:attribute name="Type" type="ST_JoinDirection" default="Inner" wblid:cname="Type"
use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.11 CT\_Joins

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Container type for the joins in a **CT\_Query** (section 2.2.3.18). MUST contain one or more **Join** elements.

*Child Elements:*

**Join:** A **CT\_Join** (section [2.2.3.10](#)) element that specifies a single join in the **CT\_Query** (section 2.2.3.18).

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

```
<xsd:complexType name="CT_Joins">
  <xsd:sequence>
    <xsd:element name="Join" wblid:cname="Join" maxOccurs="unbounded" type="CT_Join"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.12 CT\_Parameter

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Parameters](#)

Specifies a single parameter of a **CT\_Reference** (section [2.2.3.6](#)) or a **CT\_Query** (section [2.2.3.18](#)).

*Attributes:*

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the parameter.

**Type:** An **ST\_FieldType** (section [2.2.4.6](#)) attribute that specifies the data type of the parameter.

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

```
<xsd:complexType name="CT_Parameter">
```

```

    <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
    <xsd:attribute name="Type" type="ST_FieldType" use="required" wblid:cname="Type"/>
</xsd:complexType>

```

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

### 2.2.3.13 CT\_Parameters

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT Reference](#), [CT Query](#)

Container type for the parameters in a **CT\_Reference** (section 2.2.3.6) or in a **CT\_Query** (section 2.2.3.18). MUST contain one or more **Parameter** elements.

*Child Elements:*

**Parameter:** A **CT\_Parameter** (section [2.2.3.12](#)) element that specifies one parameter of a **CT\_Reference** (section 2.2.3.6) or of a **CT\_Query** (section 2.2.3.18).

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

```

<xsd:complexType name="CT_Parameters">
  <xsd:sequence>
    <xsd:element name="Parameter" maxOccurs="unbounded" wblid:cname="Parameter"
type="CT_Parameter"/>
  </xsd:sequence>
</xsd:complexType>

```

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

### 2.2.3.14 CT\_ParameterDefinition

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT ParameterDefinitions](#)

Specifies one parameter that is accepted by a Data Macro (section [2.1.2.2](#))

*Attributes:*

**Description:** An **Ignored Value** (section [2.1.4](#)).

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the parameter. The value of this attribute MUST be unique among all other elements of this type **CT\_ParameterDefinition** in the same Data Macro (section 2.1.2.2).

**Type:** An **ST\_FieldType** (section [2.2.4.6](#)) attribute that specifies the data type of the parameter.

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

```

<xsd:complexType name="CT_ParameterDefinition">
  <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
  <xsd:attribute name="Description" type="ST_LongString" wblid:cname="Description"
use="optional"/>
  <xsd:attribute name="Type" type="ST_FieldType" use="required" wblid:cname="Type"/>

```

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

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

### 2.2.3.15 CT\_ParameterDefinitions

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacro](#)

Container type for the parameter definitions in a Data Macro (section [2.1.2.2](#)). MUST contain one or more **Parameter** elements.

*Child Elements:*

**Parameter:** A **CT\_ParameterDefinition** (section [2.2.3.14](#)) element that specifies a parameter supported by the Data Macro (section 2.1.2.2).

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

```
<xsd:complexType name="CT_ParameterDefinitions">
  <xsd:sequence>
    <xsd:element name="Parameter" maxOccurs="unbounded" wblid:cname="Parameter"
type="CT_ParameterDefinition"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.16 CT\_ParameterValue

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_ParameterValues](#)

Specifies one parameter to be passed into a macro action (section [2.2.5.1](#)).

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies the value of the parameter.

*Attributes:*

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the parameter.

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

```
<xsd:complexType name="CT_ParameterValue">
  <xsd:sequence>
    <xsd:element name="Expression" type="CT_ExpressionContents" wblid:cname="Expression"/>
  </xsd:sequence>
  <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
</xsd:complexType>
```

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

### 2.2.3.17 CT\_ParameterValues

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Action](#), [CT\\_ForEachRecordData](#), [CT\\_LookupRecordData](#), [CT\\_CreateRecordData](#)

Container type for the parameter values to be passed into a macro action (section [2.2.5.1](#)). MUST contain one or more **Parameter** elements or **OutputParameter** elements.

*Child Elements:*

**OutputParameter:** A **CT\_OutputParameter** (section [2.2.3.75](#)) element that specifies the name of a local variable to store the output parameter value. This element MUST NOT appear in any **CT\_ParameterValues** other than inside **CT\_CreateRecord** (section [2.2.3.26](#)) or **RunDataMacro** action (section [2.2.5.1.13](#)). This element MUST NOT appear more than once inside **CT\_CreateRecord** (section [2.2.3.26](#)).

**Parameter:** A **CT\_ParameterValue** (section [2.2.3.16](#)) element that specifies a single value to be passed into a macro action (section [2.2.5.1](#)). The value of the **Name** attribute of each **Parameter** element MUST be unique within the same **CT\_ParameterValues**. This element MUST NOT appear inside **CT\_ParameterValues** referred by **CT\_CreateRecord** (section [2.2.3.26](#)).

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

```
<xsd:complexType name="CT_ParameterValues">
  <xsd:sequence>
    <xsd:element name="Parameter" minOccurs="0" maxOccurs="unbounded" wblid:cname="Parameter"
type="CT_ParameterValue"/>
    <xsd:element name="OutputParameter" minOccurs="0" maxOccurs="unbounded"
wblid:cname="OutputParameter" type="CT_OutputParameter"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.18 CT\_Query

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_FormDef](#), [Query](#)

Specifies a Query (section [2.1.3](#)).

*Child Elements:*

**GroupRestriction:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies a filter for groups in the query. All groups included in the query results MUST meet the criteria defined by the group restriction expression.

**Groups:** A **CT\_Groups** (section [2.2.3.74](#)) element that specifies the groups into which records will be placed in the query results.

**Joins:** A **CT\_Joins** (section [2.2.3.11](#)) element that specifies all joins in the query.

**Ordering:** A **CT\_Ordering** (section [2.2.3.3](#)) element that specifies the order of the query results.

**Parameters:** A **CT\_Parameters** (section [2.2.3.13](#)) element that specifies all parameters in the query.

**References:** A **CT\_References** (section [2.2.3.7](#)) element that specifies all input sources for the query.

**Restriction:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies a filter for the query. All rows included in the query results **MUST** meet the criteria defined by the restriction expression.

**Results:** A **CT\_Results** (section [2.2.3.9](#)) element that specifies the columns included in the result of running the query.

**TopPercent:** A **CT\_TopPercent** (section [2.2.3.77](#)) element that specifies the limit on the percentage of records to be returned as query results.

**TopRows:** A **CT\_TopRows** (section [2.2.3.76](#)) element that specifies the limit on the number of records to be returned as query results.

*Attributes:*

**Distinct:** A boolean ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute. If this attribute is true, then the query results **MUST** contain only unique rows.

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the query. **SHOULD** be present when **CT\_Query** (section [2.2.3.18](#)) is used as a child element for **CT\_FormDef** (section [2.2.3.81](#)). **SHOULD NOT** be present when the **CT\_Query** (section [2.2.3.18](#)) is the top element of the document.

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

```
<xsd:complexType name="CT_Query">
  <xsd:sequence>
    <xsd:choice minOccurs="0">
      <xsd:element name="TopRows" type="CT_TopRows" wblid:cname="TopRows"/>
      <xsd:element name="TopPercent" type="CT_TopPercent" wblid:cname="TopPercent"/>
    </xsd:choice>
    <xsd:element name="Parameters" minOccurs="0" type="CT_Parameters"
wblid:cname="Parameters"/>
    <xsd:element name="References" type="CT_References" wblid:cname="References"/>
    <xsd:element name="Results" type="CT_Results" wblid:cname="Results"/>
    <xsd:element name="Joins" minOccurs="0" type="CT_Joins" wblid:cname="Joins"/>
    <xsd:element name="Restriction" type="CT_Expression" minOccurs="0"
wblid:cname="Restriction"/>
    <xsd:element name="Groups" minOccurs="0" type="CT_Groups" wblid:cname="Groups"/>
    <xsd:element name="GroupRestriction" minOccurs="0" type="CT_Expression"
wblid:cname="GroupRestriction"/>
    <xsd:element name="Ordering" minOccurs="0" type="CT_Ordering" wblid:cname="Ordering"/>
  </xsd:sequence>
  <xsd:attribute name="Name" type="ST_ObjectName" wblid:cname="Name" use="optional"/>
  <xsd:attribute name="Distinct" type="xsd:boolean" wblid:cname="Distinct" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.19 CT\_Argument

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Action](#)

Specifies an argument of a macro action (section [2.2.5.1](#)).

*Attributes:*

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the argument.

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

```
<xsd:complexType name="CT Argument">
  <xsd:simpleContent>
    <xsd:extension base="ST LongString">
      <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
    </xsd:extension>
  </xsd:simpleContent>
</xsd:complexType>
```

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

### 2.2.3.20 CT\_Action

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#), [CT\\_UserInterfaceMacroStatements](#)

Specifies a macro action (section [2.2.5.1](#)).

*Child Elements:*

**Argument:** A **CT\_Argument** (section [2.2.3.19](#)) element that specifies an argument for the action where the value of the argument is a string.

**ExpressionArgument:** A **CT\_ExpressionArgument** (section [2.2.3.78](#)) element that specifies an argument for the action where the value of the argument is an expression.

**Parameters:** A **CT\_ParameterValues** (section [2.2.3.17](#)) element that specifies the parameters to the action. MUST NOT be present except as part of the **RunDataMacro** action (section [2.2.5.1.13](#)), the **ChangeView** action (section [2.2.5.1.1](#)), or the **OpenPopup** action (section [2.2.5.1.10](#)).

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the action. MUST be one of the actions specified by section 2.2.5.1.

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

```
<xsd:complexType name="CT Action">
  <xsd:sequence>
    <xsd:choice minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="Argument" wblid:cname="Argument" type="CT_Argument"/>
      <xsd:element name="ExpressionArgument" wblid:cname="ExpressionArgument"
type="CT_ExpressionArgument"/>
    </xsd:choice>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```



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

### 2.2.3.21 CT\_ForEachRecordData

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_ForEachRecord](#)

Specifies a set of records.

*Child Elements:*

**Parameters:** A **CT\_ParameterValues** (section [2.2.3.17](#)) element that specifies the parameters to the query (section [2.1.3](#)) specified by the **Reference** element. MUST NOT be present if the **Reference** element specifies a Table (section [2.1.1](#)).

**Reference:** An **ST\_ObjectName** (section [2.2.4.1](#)) element that specifies a Table (section 2.1.1) or a Query (section 2.1.3).

**WhereCondition:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies an expression that selects a set of records from the records in the object specified by the **Reference** element.

*Attributes:*

**Alias:** An **ST\_ObjectName** (section 2.2.4.1) attribute that specifies a name for this set of records.

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

```
<xsd:complexType name="CT_ForEachRecordData">
  <xsd:sequence>
    <xsd:element name="Reference" type="ST_ObjectName" wblid:cname="Reference"/>
    <xsd:element name="WhereCondition" minOccurs="0" type="CT_Expression"
wblid:cname="WhereCondition"/>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.22 CT\_ForEachRecord

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#)

Specifies a set of commands that are performed for each record in a specified set of records.

MUST NOT be present in a **CT\_DataMacroStatements** (section 2.2.3.38) element that is a child of a **CT\_CreateRecord** (section [2.2.3.26](#)) or **CT\_EditRecord** (section [2.2.3.28](#)) element.

*Child Elements:*

**Data:** A **CT\_ForEachRecordData** (section [2.2.3.21](#)) element that specifies the set of records on which to perform the commands.

**Statements:** A **CT\_DataMacroStatements** (section 2.2.3.38) element that specifies a set of commands to perform on each record.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_ForEachRecord">
  <xsd:sequence>
    <xsd:element name="Data" wblid:cname="Data" type="CT_ForEachRecordData"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.23 CT\_LookupRecordData

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_LookupRecord](#)

Specifies a single record.

*Child Elements:*

**Parameters:** A **CT\_ParameterValues** (section [2.2.3.17](#)) element that specifies the parameters to the query (section [2.1.3](#)) specified by the **Reference** element. MUST NOT be present if the **Reference** element specifies a Table (section [2.1.1](#)).

**Reference:** An [ST\\_ObjectName](#) element that specifies a Table (section 2.1.1) or a Query (section 2.1.3).

**WhereCondition:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies an expression that selects a single record from the object specified by the **Reference** element

*Attributes:*

**Alias:** An **ST\_ObjectName** section (2.2.4.1) attribute that specifies a name for this record.

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

```
<xsd:complexType name="CT_LookupRecordData">
  <xsd:sequence>
    <xsd:element name="Reference" type="ST_ObjectName" wblid:cname="Reference"/>
    <xsd:element name="WhereCondition" minOccurs="0" type="CT_Expression"
wblid:cname="WhereCondition"/>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.24 CT\_LookupRecord

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#)

Specifies a set of commands that are performed for a single record.

MUST NOT be present in a **CT\_DataMacroStatements** (section 2.2.3.38) element that is a child of a **CT\_CreateRecord** (section 2.2.3.26) or **CT\_EditRecord** (section 2.2.3.28) element.

*Child Elements:*

**Data:** A **CT\_LookupRecordData** (section 2.2.3.23) element that specifies a single record.

**Statements:** A **CT\_DataMacroStatements** (section 2.2.3.38) element that specifies a set of commands to perform on a single record.

*Attributes:*

**Collapsed:** An Ignored Value (section 2.1.4).

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

```
<xsd:complexType name="CT_LookupRecord">
  <xsd:sequence>
    <xsd:element name="Data" wblid:cname="Data" type="CT_LookupRecordData"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.25 CT\_CreateRecordData

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_CreateRecord](#)

Specifies a Table (section 2.1.1) in which to create a new record.

*Child Elements:*

**Parameters:** A **CT\_ParameterValues** (section 2.2.3.17) element that specifies the local variable to store the identifier of the newly created record.

**Reference:** An **ST\_ObjectName** (section 2.2.4.1) element that specifies a Table (section 2.1.1).

*Attributes:*

**Alias:** An **ST\_ObjectName** (section 2.2.4.1) attribute that specifies a name for the newly created record in the Table (section 2.1.1).

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

```
<xsd:complexType name="CT_CreateRecordData">
  <xsd:sequence>
```

```

    <xsd:choice>
      <xsd:element name="Reference" type="ST_ObjectName" wblid:cname="Reference"/>
    </xsd:choice>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>

```

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

### 2.2.3.26 CT\_CreateRecord

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#)

Specifies a set of commands that are performed on a newly created record.

MUST NOT be present in a **CT\_DataMacroStatements** (section 2.2.3.38) element that is a child of a **CT\_EditRecord** (section [2.2.3.28](#)) element or another **CT\_CreateRecord** (section 2.2.3.26) element.

*Child Elements:*

**Data:** A **CT\_CreateRecordData** (section [2.2.3.25](#)) element that specifies the data source in which a record will be created.

**Statements:** A **CT\_DataMacroStatements** (section 2.2.3.38) element that specifies a set of commands to perform on the new record.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```

<xsd:complexType name="CT_CreateRecord">
  <xsd:sequence>
    <xsd:element name="Data" wblid:cname="Data" type="CT_CreateRecordData"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>

```

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

### 2.2.3.27 CT\_EditRecordData

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_EditRecord](#)

Specifies a single record.

*Attributes:*

**Alias:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name given to a single record. This attribute MUST be the same as the **Alias** attribute of a **CT\_ForEachRecordData** (section

[2.2.3.21](#)) element, the **Alias** attribute of a **CT\_LookupRecordData** (section [2.2.3.23](#)) element, or the name of the parent Table (section [2.1.1](#)) of the Data Macro (section [2.1.2.2](#)).

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

```
<xsd:complexType name="CT_EditRecordData">
  <xsd:attribute name="Alias" type="ST ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.28 CT\_EditRecord

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#)

Specifies a set of commands to run on a single record.

MUST NOT be present in a **CT\_DataMacroStatements** (section 2.2.3.38) that is a child of a **CT\_CreateRecord** (section [2.2.3.26](#)) element or of another **CT\_EditRecord** (section 2.2.3.28) element.

*Child Elements:*

**Data:** A **CT\_EditRecordData** (section [2.2.3.27](#)) element that specifies a single record.

**Statements:** A **CT\_DataMacroStatements** (section 2.2.3.38) element that specifies a set of commands to perform on a single record.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_EditRecord">
  <xsd:sequence>
    <xsd:element name="Data" type="CT_EditRecordData" wblid:cname="Data"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.29 CT\_UserInterfaceIf

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceConditionalBlock](#)

Specifies a branch of a conditional block.

*Child Elements:*

**Condition:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies a condition, which evaluates to true or false.

**Statements:** A **CT\_UserInterfaceMacroStatements** (section [2.2.3.37](#)) element that specifies the set of commands that are performed if the expression in the **Condition** element evaluates to true.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_UserInterfaceIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.30 CT\_UserInterfaceElseIf

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceConditionalBlock](#)

Specifies a branch of a conditional block. This element **MUST** follow an **If** or another **ElseIf** element in the parent element.

*Child Elements:*

**Condition:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies a condition, which evaluates to true or false.

**Statements:** A **CT\_UserInterfaceMacroStatements** (section [2.2.3.37](#)) element that specifies the set of commands that are performed if the expression in the **Condition** element evaluates to true and the **Condition** elements in the preceding **If** and **ElseIf** elements in the parent element evaluate to false.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_UserInterfaceElseIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.31 CT\_UserInterfaceElse

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceConditionalBlock](#)

Specifies a conditional branch. This element MUST follow an **If** or **ElseIf** element in the parent element.

*Child Elements:*

**Statements:** A **CT\_UserInterfaceMacroStatements** (section [2.2.3.37](#)) element that specifies the set of commands that are performed if the **Condition** elements of the **If** and **ElseIf** elements in the parent element evaluate to false.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_UserInterfaceElse">
  <xsd:sequence>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
      wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.32 CT\_DataIf

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataConditionalBlock](#)

Specifies a branch of a conditional block.

*Child Elements:*

**Condition:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies a condition, which evaluates to true or false.

**Statements:** A **CT\_DataMacroStatements** (section [2.2.3.38](#)) element that specifies the set of commands that are performed if the expression in the **Condition** element evaluates to true.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_DataIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

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

### 2.2.3.33 CT\_DataElseIf

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataConditionalBlock](#)

Specifies a branch of a conditional block. This element MUST follow an **If** or another **ElseIf** element in the parent element.

*Child Elements:*

**Condition:** A **CT\_Expression** (section [2.2.3.1](#)) element that specifies a condition, which evaluates to true or false.

**Statements:** A **CT\_DataMacroStatements** (section [2.2.3.38](#)) element that specifies the set of commands that are performed if the expression in the **Condition** element evaluates to true and the **Condition** elements in the preceding **If** and **ElseIf** elements in the parent element evaluate to false.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

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

```
<xsd:complexType name="CT_DataElseIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.34 CT\_DataElse

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataConditionalBlock](#)

Specifies a conditional branch. This element MUST follow an **If** or **ElseIf** element in the parent element.

*Child Elements:*

**Statements:** A **CT\_DataMacroStatements** (section [2.2.3.38](#)) element that specifies the set of commands that are performed if the **Condition** elements of the preceding **If** and **ElseIf** elements in the parent element evaluate to false.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).



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

```
<xsd:complexType name="CT_DataElse">
  <xsd:sequence>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.35 CT\_UserInterfaceConditionalBlock

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceMacroStatements](#)

Specifies a conditional branch in a User Interface Macro (section [2.1.2.1](#)). At runtime, if the expression in the **Condition** element of the **If** element evaluates to true, the macro continues performing the commands within the **Statements** child element of the **If** element and all other branches are skipped. Otherwise the expression in the **Condition** element of each **ElseIf** child, if any are present, is evaluated in order until one is found that evaluates to true. If such a child is found, the macro continues running in the **Statements** child element of that **ElseIf** element and all other branches are skipped. If the conditions of the **If** child element and all **ElseIf** child elements evaluate to false and an **Else** element is present, the macro continues running in the **Statements** child of the **Else** element.

*Child Elements:*

**Else:** A **CT\_UserInterfaceElse** (section [2.2.3.31](#)) element that specifies a branch to be taken if none of the conditions of the other child elements evaluate to true.

**ElseIf:** A **CT\_UserInterfaceElseIf** (section [2.2.3.30](#)) element that specifies a subsequent condition and logical branch to be taken if the **If** branch and previous **ElseIf** branches were not taken.

**If:** A **CT\_UserInterfaceIf** (section [2.2.3.29](#)) element that specifies the first possible condition and logical branch. **MUST** be present.

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

```
<xsd:complexType name="CT_UserInterfaceConditionalBlock">
  <xsd:sequence>
    <xsd:element name="If" wblid:cname="If" type="CT_UserInterfaceIf"/>
    <xsd:element name="ElseIf" minOccurs="0" maxOccurs="unbounded" wblid:cname="ElseIf"
type="CT_UserInterfaceElseIf"/>
    <xsd:element name="Else" minOccurs="0" wblid:cname="Else" type="CT_UserInterfaceElse"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.36 CT\_DataConditionalBlock

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#)

Specifies a conditional branch in a Data Macro (section [2.1.2.2](#)). At runtime, if the expression in the **Condition** element of the **If** element evaluates to true, the macro continues running in the commands within the **Statements** child element of the **If** element and all other branches are skipped. Otherwise the expression in the **Condition** element of each **ElseIf** child, if any are present, is evaluated in order until one is found that evaluates to true. If such a child is found, the macro continues running in the **Statements** child element of that **ElseIf** element and all other branches are skipped. If the conditions of the **If** child element and all **ElseIf** child elements evaluate to false and an **Else** element is present, the macro continues running in the **Statements** child of the **Else** element.

*Child Elements:*

**Else:** A **CT\_DataElse** (section [2.2.3.34](#)) element that specifies a branch to be taken if none of the conditions of the other child elements evaluate to true.

**ElseIf:** A **CT\_DataElseIf** (section [2.2.3.33](#)) element that specifies a subsequent condition and logical branch to be taken if the **If** branch and previous **ElseIf** branches were not taken.

**If:** A **CT\_DataIf** (section [2.2.3.32](#)) element that specifies the first possible condition and logical branch. **MUST** be present.

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

```
<xsd:complexType name="CT_DataConditionalBlock">
  <xsd:sequence>
    <xsd:element name="If" wbld:cname="If" type="CT_DataIf"/>
    <xsd:element name="ElseIf" minOccurs="0" maxOccurs="unbounded" wbld:cname="ElseIf"
type="CT_DataElseIf"/>
    <xsd:element name="Else" minOccurs="0" wbld:cname="Else" type="CT_DataElse"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.37 CT\_UserInterfaceMacroStatements

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceIf](#), [CT\\_UserInterfaceElseIf](#), [CT\\_UserInterfaceMacroStatementGroup](#), [CT\\_UserInterfaceElse](#), [CT\\_UserInterfaceMacro](#)

Container type that contains zero or more elements that specify the commands to be performed when a User Interface Macro (section [2.1.2.1](#)) is called.

*Child Elements:*

**Action:** A **CT\_Action** (section [2.2.3.20](#)) element that specifies a single macro action.

**Comment:** An **ST\_LongString** (section [2.2.4.4](#)) element that is ignored when the commands are performed.

**ConditionalBlock:** A [CT\\_UserInterfaceConditionalBlock](#) element that specifies a conditional branch.

**StatementGroup:** A [CT\\_UserInterfaceMacroStatementGroup](#) element that specifies a user-defined grouping of macro commands.

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

```

<xsd:complexType name="CT_UserInterfaceMacroStatements">
  <xsd:choice minOccurs="0" maxOccurs="unbounded">
    <xsd:element name="Action" type="CT_Action" wblid:cname="Action"/>
    <xsd:element name="Comment" type="ST_LongString" wblid:cname="Comment"/>
    <xsd:element name="ConditionalBlock" type="CT_UserInterfaceConditionalBlock"
wblid:cname="ConditionalBlock"/>
    <xsd:element name="StatementGroup" type="CT_UserInterfaceMacroStatementGroup"
wblid:cname="StatementGroup"/>
  </xsd:choice>
</xsd:complexType>

```

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

### 2.2.3.38 CT\_DataMacroStatements

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_ForEachRecord](#), [CT\\_LookupRecord](#), [CT\\_CreateRecord](#), [CT\\_EditRecord](#), [CT\\_DataIf](#), [CT\\_DataMacroStatementGroup](#), [CT\\_DataElseIf](#), [CT\\_DataElse](#), [CT\\_DataMacro](#)

Container type that contains zero or more elements that specify the commands to be performed when a Data Macro (section [2.1.2.2](#)) is called.

*Child Elements:*

**Action:** A **CT\_Action** (section [2.2.3.20](#)) element that specifies a single macro action.

**Comment:** An **ST\_LongString** (section [2.2.4.4](#)) element that is ignored when the commands are performed.

**ConditionalBlock:** A **CT\_DataConditionalBlock** (section [2.2.3.36](#)) element that specifies a conditional branch.

**CreateRecord:** A **CT\_CreateRecord** (section [2.2.3.26](#)) element that specifies a macro block that creates a record.

**EditRecord:** A **CT\_EditRecord** (section [2.2.3.28](#)) element that specifies a macro block that changes a record.

**ForEachRecord:** A **CT\_ForEachRecord** (section [2.2.3.22](#)) element that specifies a macro block that performs actions on multiple records.

**LookupRecord:** A **CT\_LookupRecord** (section [2.2.3.24](#)) element that specifies a macro block that performs actions on a single record.

**StatementGroup:** A **CT\_DataMacroStatementGroup** (section [2.2.3.40](#)) element that specifies a user-defined grouping of macro commands.

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

```

<xsd:complexType name="CT_DataMacroStatements">
  <xsd:choice minOccurs="0" maxOccurs="unbounded">
    <xsd:element name="Action" type="CT_Action" wblid:cname="Action"/>
    <xsd:element name="Comment" type="ST_LongString" wblid:cname="Comment"/>
    <xsd:element name="ForEachRecord" type="CT_ForEachRecord" wblid:cname="ForEachRecord"/>
    <xsd:element name="LookupRecord" type="CT_LookupRecord" wblid:cname="LookupRecord"/>
    <xsd:element name="CreateRecord" type="CT_CreateRecord" wblid:cname="CreateRecord"/>
    <xsd:element name="EditRecord" type="CT_EditRecord" wblid:cname="EditRecord"/>
    <xsd:element name="ConditionalBlock" type="CT_DataConditionalBlock"
wblid:cname="ConditionalBlock"/>
  </xsd:choice>
</xsd:complexType>

```

```

    <xsd:element name="StatementGroup" type="CT_DataMacroStatementGroup"
    wblld:cname="StatementGroup"/>
  </xsd:choice>
</xsd:complexType>

```

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

### 2.2.3.39 CT\_UserInterfaceMacroStatementGroup

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceMacroStatements](#)

Container type for macro statements with which a user can organize the actions in a macro. Has no effect on the macro commands that are performed.

*Child Elements:*

**Statements:** A **CT\_UserInterfaceMacroStatements** (section 2.2.3.37) element that specifies the logic and actions to be performed in this part of the macro.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#))

**Description:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies a description of the enclosed block.

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

```

<xsd:complexType name="CT_UserInterfaceMacroStatementGroup">
  <xsd:sequence>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
    wblld:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Description" type="ST_LongString" wblld:cname="Description"
  use="optional"/>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblld:cname="Collapsed" use="optional"/>
</xsd:complexType>

```

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

### 2.2.3.40 CT\_DataMacroStatementGroup

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacroStatements](#)

Container type for macro statements with which a user can organize the actions in a macro. Has no effect on the macro commands that are performed.

*Child Elements:*

**Statements:** A **CT\_DataMacroStatements** (section 2.2.3.38) element that specifies the logic and actions to be performed in this part of the macro.

*Attributes:*

**Collapsed:** An Ignored Value (section [2.1.4](#)).

**Description:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies a description of the enclosed block.

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

```
<xsd:complexType name="CT_DataMacroStatementGroup">
  <xsd:sequence>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Description" type="ST_LongString" wblid:cname="Description"
  use="optional"/>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.41 CT\_UserInterfaceMacros

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_FormDef](#), [UserInterfaceMacros](#)

Container type for User Interface Macros (section [2.1.2.1](#)) on a form. MUST contain one or more **UserInterfaceMacro** elements.

*Child Elements:*

**UserInterfaceMacro:** A **CT\_UserInterfaceMacro** (section [2.2.3.43](#)) element that specifies a single User Interface Macro.

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

```
<xsd:complexType name="CT_UserInterfaceMacros">
  <xsd:choice maxOccurs="unbounded">
    <xsd:element name="UserInterfaceMacro" minOccurs="0" maxOccurs="unbounded"
    type="CT_UserInterfaceMacro" wblid:cname="UserInterfaceMacro"/>
  </xsd:choice>
</xsd:complexType>
```

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

### 2.2.3.42 CT\_DataMacros

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [DataMacros](#)

Container type for Data Macros (section [2.1.2.2](#)). MUST contain one or more **DataMacro** elements.

*Child Elements:*

**DataMacro:** A **CT\_DataMacro** (section [2.2.3.44](#)) element that specifies a single Data Macro (section [2.1.2.2](#)).

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

```
<xsd:complexType name="CT_DataMacros">
  <xsd:choice maxOccurs="unbounded">
    <xsd:element name="DataMacro" minOccurs="0" maxOccurs="unbounded" type="CT_DataMacro"
      wblld:cname="DataMacro"/>
  </xsd:choice>
</xsd:complexType>
```

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

### 2.2.3.43 CT\_UserInterfaceMacro

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceMacros](#), [UserInterfaceMacro](#)

Specifies a User Interface Macro (section [2.1.2.1](#)).

*Child Elements:*

**Statements:** A **CT\_UserInterfaceMacroStatements** (section [2.2.3.37](#)) element that specifies the commands to be performed when the macro is called.

*Attributes:*

**Event:** An **ST\_UserInterfaceObjectEvent** (section [2.2.4.12](#)) attribute that specifies the event that will cause the macro to be called. MUST be present if the macro is embedded in a form; MUST NOT be present otherwise.

**For:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of a control. MUST NOT appear except in a macro that is embedded in a form. If this attribute is not present, the macro will be called by the form itself. If present, the value MUST be the name of a control on the containing form whose type supports the event specified by the **Event** attribute.

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

```
<xsd:complexType name="CT_UserInterfaceMacro">
  <xsd:sequence>
    <xsd:element name="Statements" minOccurs="0" type="CT_UserInterfaceMacroStatements"
      wblld:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="For" type="ST_ObjectName" wblld:cname="For" use="optional"/>
  <xsd:attribute name="Event" type="ST_UserInterfaceObjectEvent" wblld:cname="Event"
    use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.44 CT\_DataMacro

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_DataMacros](#), [CT\\_EventDataMacro](#), [DataMacro](#)

Specifies a Data Macro (section [2.1.2.2](#)).

*Child Elements:*

**Parameters:** A **CT\_ParameterDefinitions** (section [2.2.3.15](#)) element that specifies the list of parameters that the macro accepts when called. MUST NOT be present if the **Event** attribute is present.

**Statements:** A **CT\_DataMacroStatements** (section [2.2.3.38](#)) element that specifies the commands to be performed when the macro is called.

*Attributes:*

**Event:** An **ST\_DataObjectEvent** (section [2.2.4.2](#)) attribute that specifies the type of event that will cause the macro to be called.

**Version:** A string ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the version of the Data Macro (section 2.1.2.2).

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

```
<xsd:complexType name="CT_DataMacro">
  <xsd:sequence>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterDefinitions"
      wblid:cname="Parameters"/>
    <xsd:element name="Statements" minOccurs="0" type="CT_DataMacroStatements"
      wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Event" type="ST_DataObjectEvent" wblid:cname="Event" use="optional"/>
  <xsd:attribute name="Version" type="xsd:string" wblid:cname="Version" use="optional"/>
</xsd:complexType>
```

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

### 2.2.3.45 CT\_ExpressionContents

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_NamedExpression](#), [CT\\_Expression](#), [CT\\_ConstraintWithExpression](#), [CT\\_CheckConstraint](#), [CT\\_DefaultConstraint](#), [CT\\_OrderExpression](#), [CT\\_Result](#), [CT\\_GroupExpression](#), [CT\\_ParameterValue](#), [CT\\_ExpressionArgument](#), [Expression](#)

Specifies an expression.

*Child Elements:*

**BitLiteral:** A [CT\\_BitLiteral](#) element that specifies a **Boolean** literal.

**DateLiteral:** A [CT\\_DateLiteral](#) element that specifies a date literal.

**DateTimeLiteral:** A [CT\\_DateTimeLiteral](#) element that specifies a literal with both date and time components.

**DecimalLiteral:** A [CT\\_DecimalLiteral](#) element that specifies a decimal literal.

**FunctionCall:** A [CT\\_FunctionCall](#) element that specifies a function call.

**Identifier:** A [CT\\_Identifier](#) element that specifies an identifier.

**IntegerLiteral:** A [CT\\_IntegerLiteral](#) element that specifies an integer literal.

**NullLiteral:** A [CT\\_NullLiteral](#) element that specifies a null literal.

**Original:** An Ignored Value (section [2.1.4](#)).

**StringLiteral:** A [CT\\_StringLiteral](#) element that specifies a string literal.

**TimeLiteral:** A [CT\\_TimeLiteral](#) element that specifies a time literal.

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

```
<xsd:complexType name="CT_ExpressionContents">
  <xsd:sequence>
    <xsd:element name="Original" type="xsd:string" minOccurs="0" wblld:cname="Original"/>
    <xsd:choice>
      <xsd:element name="FunctionCall" type="CT_FunctionCall" wblld:cname="FunctionCall"/>
      <xsd:element name="Identifier" type="CT_Identifier" wblld:cname="Identifier"/>
      <xsd:element name="DecimalLiteral" type="CT_DecimalLiteral"
wblld:cname="DecimalLiteral"/>
      <xsd:element name="IntegerLiteral" type="CT_IntegerLiteral"
wblld:cname="IntegerLiteral"/>
      <xsd:element name="NullLiteral" type="CT_NullLiteral" wblld:cname="NullLiteral"/>
      <xsd:element name="StringLiteral" type="CT_StringLiteral" wblld:cname="StringLiteral"/>
      <xsd:element name="DateTimeLiteral" type="CT_DateTimeLiteral"
wblld:cname="DateTimeLiteral"/>
      <xsd:element name="DateLiteral" type="CT_DateLiteral" wblld:cname="DateLiteral"/>
      <xsd:element name="TimeLiteral" type="CT_TimeLiteral" wblld:cname="TimeLiteral"/>
      <xsd:element name="BitLiteral" type="CT_BitLiteral" wblld:cname="BitLiteral"/>
    </xsd:choice>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.46 CT\_FunctionCall

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_NamedExpression](#), [CT\\_IndexedFunctionCall](#), [CT\\_ExpressionContents](#)

Specifies a function call in an expression. The child elements specify arguments to the function call. Each of the  $n$  child elements MUST have an **Index** attribute with a unique value between 0 and  $n-1$ , inclusive, indicating the child's position in the argument list, with 0 specifying the first argument.

*Child Elements:*

**BitLiteral:** A [CT\\_IndexedBitLiteral](#) element that specifies a Boolean literal.

**DateLiteral:** A [CT\\_IndexedDateLiteral](#) element that specifies a date literal.

**DatePartLiteral:** A [CT\\_IndexedDatePartLiteral](#) element that specifies a date part literal.

**DateTimeLiteral:** A [CT\\_IndexedDateTimeLiteral](#) element that specifies a literal containing both date and time components.

**DecimalLiteral:** A [CT\\_IndexedDecimalLiteral](#) element that specifies a decimal literal.

**FunctionCall:** A [CT\\_IndexedFunctionCall](#) element that specifies a function call.

**Identifier:** A [CT\\_IndexedIdentifier](#) element that specifies an identifier.

**IntegerLiteral:** A [CT\\_IndexedIntegerLiteral](#) element that specifies an integer literal.

**NullLiteral:** A [CT\\_IndexedNullLiteral](#) element that specifies a null literal.



**StringLiteral:** A [CT\\_IndexedStringLiteral](#) element that specifies a string literal.

**TimeLiteral:** A [CT\\_IndexedTimeLiteral](#) element that specifies a time literal.

**TypeLiteral:** A [CT\\_IndexedTypeLiteral](#) element that specifies a type name literal.

*Attributes:*

**Name:** A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the name of the function. MUST be one of the following values:

Value
+
-
*
/
%
>
<
>=
<=
=
<>
Abs
And
Avg
Between
Cast
Ceiling
CharIndex
Choose
Coalesce
Concat
Count
DateAdd
DateDiff
DateFromParts
DatePart

<b>Value</b>
DateWithTimeFromParts
Day
EOMonth
Exp
Floor
Format
IIf
In
IsNull
Left
Len
Like
Log
Log10
Lower
LTrim
Max
Min
Month
Not
Now
Or
Parse
Pi
Power
Rand
Replace
Replicate
Right
Round
RTrim
Sign

Value
Sqrt
StDev
Stuff
SubString
Sum
TimeFromParts
Today
Try_Cast
Try_Parse
Update
Upper
UserDisplayName
UserEmailAddress
Var
Year

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

```

<xsd:complexType name="CT FunctionCall">
  <xsd:sequence minOccurs="0" maxOccurs="unbounded">
    <xsd:choice>
      <xsd:element name="FunctionCall" type="CT_IndexedFunctionCall"
wblld:cname="FunctionCall"/>
      <xsd:element name="Identifier" type="CT_IndexedIdentifier" wblld:cname="Identifier"/>
      <xsd:element name="DecimalLiteral" type="CT_IndexedDecimalLiteral"
wblld:cname="DecimalLiteral"/>
      <xsd:element name="IntegerLiteral" type="CT_IndexedIntegerLiteral"
wblld:cname="IntegerLiteral"/>
      <xsd:element name="NullLiteral" type="CT_IndexedNullLiteral" wblld:cname="NullLiteral"/>
      <xsd:element name="StringLiteral" type="CT_IndexedStringLiteral"
wblld:cname="StringLiteral"/>
      <xsd:element name="TypeLiteral" type="CT_IndexedTypeLiteral" wblld:cname="TypeLiteral"/>
      <xsd:element name="DatePartLiteral" type="CT_IndexedDatePartLiteral"
wblld:cname="DatePartLiteral"/>
      <xsd:element name="DateTimeLiteral" type="CT_IndexedDateTimeLiteral"
wblld:cname="DateTimeLiteral"/>
      <xsd:element name="DateLiteral" type="CT_IndexedDateLiteral" wblld:cname="DateLiteral"/>
      <xsd:element name="TimeLiteral" type="CT_IndexedTimeLiteral" wblld:cname="TimeLiteral"/>
      <xsd:element name="BitLiteral" type="CT_IndexedBitLiteral" wblld:cname="BitLiteral"/>
    </xsd:choice>
  </xsd:sequence>
  <xsd:attribute name="Name" type="xsd:string" use="required" wblld:cname="Name"/>
</xsd:complexType>

```

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

### 2.2.3.47 CT\_Identifier

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedIdentifier](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies the name of an identifier in an expression.

*Attributes:*

**Name:** A string ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the name of the identifier. MUST NOT be empty. If the element containing this attribute is the descendant of a **CT\_FormDef** (section [2.2.3.81](#)) element, then the value MUST be the name of a **control**, a user interface macro variable (section [2.1.2.3.1](#)), or a column in the database application. Otherwise, the value MUST be the name of a column in the database application.

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

```
<xsd:complexType name="CT_Identifier">
  <xsd:attribute name="Name" type="xsd:string" use="required" wld:cname="Name"/>
</xsd:complexType>
```

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

### 2.2.3.48 CT\_IntegerLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedIntegerLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents an integer in an expression.

*Attributes:*

**Value:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IntegerLiteral">
  <xsd:attribute name="Value" type="xsd:int" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.49 CT\_NullLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedNullLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a null value in an expression.

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

```
<xsd:complexType name="CT_NullLiteral"/>
```

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

### 2.2.3.50 CT\_StringLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedStringLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a string value in an expression.

*Attributes:*

**Value:** A **string** ([XMLSCHEMA2] section 3.2.1) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_StringLiteral">
  <xsd:attribute name="Value" type="xsd:string" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.51 CT\_DateTimeLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedDateTimeLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a value with both date and time components in an expression.

*Attributes:*

**Value:** A **dateTime** ([XMLSCHEMA2] section 3.2.7) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_DateTimeLiteral">
  <xsd:attribute name="Value" type="xsd:dateTime" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.52 CT\_TimeLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedTimeLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a time value in an expression.

*Attributes:*

**Value:** A **time** ([\[XMLSCHEMA2\]](#) section 3.2.8) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_TimeLiteral">
  <xsd:attribute name="Value" type="xsd:time" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.53 CT\_DateLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedDateLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a date value in an expression.

*Attributes:*

**Value:** A **date** ([\[XMLSCHEMA2\]](#) section 3.2.9) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_DateLiteral">
  <xsd:attribute name="Value" type="xsd:date" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.54 CT\_BitLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedBitLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a Boolean value in an expression.

*Attributes:*

**Value:** A **boolean** ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_BitLiteral">
  <xsd:attribute name="Value" type="xsd:boolean" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.55 CT\_IndexedFunctionCall

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

Referenced by: [CT\\_FunctionCall](#)

Specifies a function call that is an argument to a parent function call in an expression. The child elements specify arguments to this function call. Each of the  $n$  child elements MUST have an **Index** attribute with a unique value between 0 and  $n-1$ , inclusive, indicating the child's position in the argument list, with 0 specifying the first argument.

*Child Elements:*

**BitLiteral:** A [CT\\_IndexedBitLiteral](#) element that specifies a Boolean literal.

**DateLiteral:** A [CT\\_IndexedDateLiteral](#) element that specifies a date literal.

**DatePartLiteral:** A [CT\\_IndexedDatePartLiteral](#) element that specifies a date part literal.

**DateTimeLiteral:** A [CT\\_IndexedDateTimeLiteral](#) element that specifies a literal containing both date and time components.

**DecimalLiteral:** A [CT\\_IndexedDecimalLiteral](#) element that specifies a decimal literal.

**FunctionCall:** A [CT\\_IndexedFunctionCall](#) element that specifies a function call.

**Identifier:** A [CT\\_IndexedIdentifier](#) element that specifies an identifier.

**IntegerLiteral:** A [CT\\_IndexedIntegerLiteral](#) element that specifies an integer literal.

**NullLiteral:** A [CT\\_IndexedNullLiteral](#) element that specifies a null literal.

**StringLiteral:** A [CT\\_IndexedStringLiteral](#) element that specifies a string literal.

**TimeLiteral:** A [CT\\_IndexedTimeLiteral](#) element that specifies a time literal.

**TypeLiteral:** A [CT\\_IndexedTypeLiteral](#) element that specifies a type name literal.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of this function call in the list of arguments of the parent function call.

**Name:** A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the name of the function. MUST be one of the following values:

Value
+
-
*
/
%
>
<
>=
<=
=

Value
<>
Abs
And
Avg
Between
Cast
Ceiling
CharIndex
Choose
Coalesce
Concat
Count
DateAdd
DateDiff
DateFromParts
DatePart
DateWithTimeFromParts
Day
EOMonth
Exp
Floor
Format
IIf
In
IsNull
Left
Len
Like
Log
Log10
Lower
LTrim



<b>Value</b>
Max
Min
Month
Not
Now
Or
Parse
Pi
Power
Rand
Replace
Replicate
Right
Round
RTrim
Sign
Sqrt
StDev
Stuff
SubString
Sum
TimeFromParts
Today
Try_Cast
Try_Parse
Update
Upper
UserDisplayName
UserEmailAddress
Var
Year

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

```
<xsd:complexType name="CT_IndexedFunctionCall">
  <xsd:complexContent>
    <xsd:extension base="CT_FunctionCall">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.56 CT\_IndexedIdentifier

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies an identifier that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the identifier in the list of arguments.

**Name:** A string ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the name of the identifier. MUST NOT be empty. If the element containing this attribute is the descendant of a **CT\_FormDef** (section [2.2.3.81](#)) element, then the value MUST be the name of a control, a user interface macro variable (section [2.1.2.3.1](#)), or a column in the database application. Otherwise, the value MUST be the name of a column in the database application.

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

```
<xsd:complexType name="CT_IndexedIdentifier">
  <xsd:complexContent>
    <xsd:extension base="CT_Identifier">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.57 CT\_IndexedIntegerLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents an integer that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedIntegerLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_IntegerLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.58 CT\_IndexedNullLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a null value that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

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

```
<xsd:complexType name="CT_IndexedNullLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_NullLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.59 CT\_IndexedStringLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a string that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedStringLiteral">
  <xsd:complexContent>
```

```

    <xsd:extension base="CT_StringLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>

```

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

### 2.2.3.60 CT\_IndexedDatePartLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a date part in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\] section 3.3.17](#)) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** An **ST\_DatePartLiteral** (section [2.2.4.15](#)) attribute that specifies the date part.

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

```

<xsd:complexType name="CT_IndexedDatePartLiteral">
  <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
  <xsd:attribute name="Value" type="ST_DatePartLiteral" use="required" wblid:cname="Value"/>
</xsd:complexType>

```

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

### 2.2.3.61 CT\_IndexedTypeLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a **data type** name literal that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\] section 3.3.17](#)) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** An **ST\_TypeLiteral** (section [2.2.4.16](#)) attribute that specifies the name of the data type.

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

```

<xsd:complexType name="CT_IndexedTypeLiteral">
  <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
  <xsd:attribute name="Value" type="ST_TypeLiteral" use="required" wblid:cname="Value"/>
</xsd:complexType>

```

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

### 2.2.3.62 CT\_IndexedDateTimeLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a date with time that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** A **dateTime** ([\[XMLSCHEMA2\]](#) section 3.2.7) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedDateTimeLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_DateTimeLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.63 CT\_IndexedTimeLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a time that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** A **time** ([\[XMLSCHEMA2\]](#) section 3.2.8) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedTimeLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_TimeLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.64 CT\_IndexedDateLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a date that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** A **date** ([\[XMLSCHEMA2\]](#) section 3.2.9) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedDateLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_DateLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.65 CT\_IndexedBitLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a Boolean value that is an argument to a function call in an expression.

*Attributes:*

**Index:** An **int** ([\[XMLSCHEMA2\]](#) section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** A **boolean** ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedBitLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_BitLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.66 CT\_Index

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Unique](#), [Index](#)

Specifies an **index** (section [2.1.1.3](#)) on a table.

*Child Elements:*

**PropertyRef:** A **CT\_PropertyRefIndex** element (section [2.2.3.88](#)) that specifies the name of a column that is part of the index.

*Attributes:*

**Caption:** An **ST\_LongString** attribute (section [2.2.4.4](#)) that specifies a caption for the index.

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the index.

**ObjectId:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies an identifier for the index.

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

```
<xsd:complexType name="CT_Index">
  <xsd:sequence>
    <xsd:element name="PropertyRef" type="CT_PropertyRefIndex" wblid:cname="PropertyRef"
      maxOccurs="unbounded"/>
  </xsd:sequence>
  <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"
    form="qualified"/>
  <xsd:attribute name="ObjectId" wblid:cname="ObjectId" type="ST_ObjectName"
    form="qualified"/>
  <xsd:attribute name="Caption" type="ST_LongString" wblid:cname="Caption" form="qualified"/>
</xsd:complexType>
```

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

### 2.2.3.67 CT\_Unique

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [Unique](#)

Specifies a unique constraint (section [2.1.1.4](#)) on a table.

*Child Elements:*

**PropertyRef:** A **CT\_PropertyRefIndex** element (section [2.2.3.88](#)) that specifies the name of a column that is part of the index.

*Attributes:*

**Caption:** An **ST\_LongString** attribute (section [2.2.4.4](#)) that specifies a caption for the index.

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the index.

**ObjectId:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies an identifier for the index.

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

```

<xsd:complexType name="CT_Unique">
  <xsd:complexContent>
    <xsd:extension base="CT_Index"/>
  </xsd:complexContent>
</xsd:complexType>

```

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

### 2.2.3.68 CT\_ConstraintWithExpression

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_CheckConstraint](#), [CT\\_DefaultConstraint](#)

Specifies a constraint on a table or on a column. MUST NOT have a **PropertyRef** child element for a table-wide constraint. MUST have one **PropertyRef** child element if the constraint is associated with a column.

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies an expression.

**PropertyRef:** A **CT\_PropertyRef** element (section [2.2.3.87](#)) that specifies the name of the column with which this constraint is associated.

*Attributes:*

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the constraint.

**ObjectId:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies an identifier for the constraint.

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

```

<xsd:complexType name="CT_ConstraintWithExpression">
  <xsd:sequence>
    <xsd:element name="PropertyRef" wblid:cname="PropertyRef" type="CT_PropertyRef"
minOccurs="0"/>
    <xsd:element name="Expression" wblid:cname="Expression" type="CT_ExpressionContents"/>
  </xsd:sequence>
  <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"
form="qualified"/>
  <xsd:attribute name="ObjectId" wblid:cname="ObjectId" type="ST_ObjectName"
form="qualified"/>
</xsd:complexType>

```

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

### 2.2.3.69 CT\_CheckConstraint

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CheckConstraint](#)

Specifies a check constraint (section [2.1.1.1](#)) on a table or on a single column.

*Child Elements:*



**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies an expression.

**PropertyRef:** A **CT\_PropertyRef** element (section [2.2.3.87](#)) that specifies the name of the column with which this constraint is associated.

*Attributes:*

**CheckData:** A **boolean** ([\[XMLSCHEMA2\]](#) section 3.2.2) attribute that specifies whether to check existing data in the column or table for constraint violations.

**Message:** An **ST\_ShortString** (section [2.2.4.3](#)) attribute that specifies the message associated with a constraint violation.

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the constraint.

**ObjectId:** An **ST\_ObjectName** attribute (section 2.2.4.1) that specifies an identifier for the constraint.

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

```
<xsd:complexType name="CT_CheckConstraint">
  <xsd:complexContent>
    <xsd:extension base="CT_ConstraintWithExpression">
      <xsd:attribute name="CheckData" wblid:cname="CheckData" type="xsd:boolean"
        use="optional" form="qualified"/>
      <xsd:attribute name="Message" wblid:cname="Message" type="ST_ShortString" use="optional"
        form="qualified"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.70 CT\_DefaultConstraint

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [DefaultConstraint](#)

Specifies a default constraint (section [2.1.1.2](#)) on a column in a table.

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies the default value.

**PropertyRef:** A **CT\_PropertyRef** element (section [2.2.3.87](#)) that specifies the name of the column.

*Attributes:*

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the constraint.

**ObjectId:** An **ST\_ObjectName** attribute (section 2.2.4.1) that specifies an identifier for the constraint.

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

```
<xsd:complexType name="CT_DefaultConstraint">
  <xsd:complexContent>
    <xsd:restriction base="CT_ConstraintWithExpression">
```

```

<xsd:sequence>
  <xsd:element name="PropertyRef" wblid:cname="PropertyRef" type="CT_PropertyRef"/>
  <xsd:element name="Expression" wblid:cname="Expression" type="CT_ExpressionContents"/>
</xsd:sequence>
</xsd:restriction>
</xsd:complexContent>
</xsd:complexType>

```

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

### 2.2.3.71 CT\_OrderExpression

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Ordering](#), [CT\\_AdHocOrdering](#)

Specifies a single expression and a direction to order.

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** element (section [2.2.3.45](#)) that specifies a single expression by which to order a result set.

If this element is used inside the **CT\_Ordering** element (section 2.2.3.3), the following rules apply. If the expression is not included in the **CT\_Results** element (section [2.2.3.9](#)), the columns used in this expression MUST be included in the **CT\_Results**. If the **CT\_Result** element (section [2.2.3.8](#)) specifying the column contains an **Alias** value, the **CT\_Identifier** element (section [2.2.3.47](#)) specifying this column MAY have that value. If the **CT\_Result** specifying the column contains **Source** and **Name** values, the **CT\_Identifier** specifying this column MAY have the **Source.Name** value. If the **CT\_Result** specifying the column contains a **Name** value and if it resolves to a unique **CT\_Result**, the **CT\_Identifier** specifying this column MAY have that value.

*Attributes:*

**Direction:** An **ST\_SortDirection** attribute (section [2.2.4.7](#)) that specifies the direction of the order.

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

```

<xsd:complexType name="CT_OrderExpression">
  <xsd:all>
    <xsd:element name="Expression" type="CT_ExpressionContents" minOccurs="1"
wblid:cname="Expression"/>
  </xsd:all>
  <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction" use="optional"/>
</xsd:complexType>

```

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

### 2.2.3.72 CT\_Group

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Groups](#)

Specifies a single column from the input sources on which to group the **CT\_Results** (section [2.2.3.9](#)). The query results will have one group for each unique value in the data of that column.

*Attributes:*

**Name:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies the name of one column from the input source specified by the **Source** attribute.

**Source:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name or alias of one of the input sources to the query. The input source **MUST** be listed in the **CT\_References** (section [2.2.3.7](#)) collection of the query. If the **CT\_Reference** (section [2.2.3.6](#)) element specifying the input source contains an **Alias** value, then this attribute **MUST** be that value.

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

```
<xsd:complexType name="CT_Group">
  <xsd:attribute name="Source" type="ST_ObjectName" wblid:cname="Source" use="required"/>
  <xsd:attribute name="Name" type="ST_LongString" wblid:cname="Name" use="required"/>
</xsd:complexType>
```

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

### 2.2.3.73 CT\_GroupExpression

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Groups](#)

Specifies a single expression that is used to group the **CT\_Results** (section [2.2.3.9](#)) of a Query (section [2.1.3](#)). The expression will be evaluated once for each row in the query results before this grouping is applied, and the query results will then be given a group for each unique result of the expression evaluation.

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section [2.2.3.45](#)) element that specifies a single expression by which to group the **CT\_Results** (section [2.2.3.9](#)) of a Query (section [2.1.3](#)).

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

```
<xsd:complexType name="CT_GroupExpression">
  <xsd:all>
    <xsd:element name="Expression" type="CT_ExpressionContents" minOccurs="1"
      wblid:cname="Expression"/>
  </xsd:all>
</xsd:complexType>
```

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

### 2.2.3.74 CT\_Groups

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Container type for all of the groupings specified in a **CT\_Query** (section [2.2.3.18](#)). **MUST** contain at least one **Group** or **GroupExpression** element. Describes the groups into which records will be placed in the result set. Query results contain one row for each group. If this element is present, then each column that is referenced in a **CT\_Result** (section [2.2.3.8](#)) element **MUST** be included either in a

**Group** element or in a **CT\_ExpressionContents** (section [2.2.3.45](#)) element that represents an aggregate expression (section [2.1.3.1](#)).

*Child Elements:*

**Group:** A [CT\\_Group](#) element that specifies a column from the input sources of a **CT\_Query** (section 2.2.3.18).

**GroupExpression:** A [CT\\_GroupExpression](#) element that specifies an expression. Query results are grouped based on that expression.

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

```
<xsd:complexType name="CT_Groups">
  <xsd:choice maxOccurs="unbounded">
    <xsd:element name="Group" wblld:cname="Group" type="CT_Group"/>
    <xsd:element name="GroupExpression" wblld:cname="GroupExpression"
type="CT_GroupExpression"/>
  </xsd:choice>
</xsd:complexType>
```

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

### 2.2.3.75 CT\_OutputParameter

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_ParameterValues](#)

Specifies one local variable to store an output parameter value.

*Attributes:*

**LocalVarName:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of a local variable which is going to store the output parameter value.

**Name:** An **ST\_ObjectName** (section 2.2.4.1) attribute that specifies the name of the output parameter.

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

```
<xsd:complexType name="CT_OutputParameter">
  <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblld:cname="Name"/>
  <xsd:attribute name="LocalVarName" type="ST_ObjectName" use="required"
wblld:cname="LocalVarName"/>
</xsd:complexType>
```

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

### 2.2.3.76 CT\_TopRows

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Specifies a number that limits the number of records returned in the results of a Query (section [2.1.3](#)).

*Attributes:*

**Rows:** A **positiveInteger** ([XMLSCHEMA2] section 3.3.25) attribute that specifies the number of records to be returned as results. If the Query (section 2.1.3) doesn't include a **CT\_Ordering** (section 2.2.3.3) element, the first **Rows** number of records are returned. If the Query (section 2.1.3) includes a **CT\_Ordering** (section 2.2.3.3) element, the first **Rows** number of records, as sorted by that ordering, are returned.

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

```
<xsd:complexType name="CT_TopRows">
  <xsd:attribute name="Rows" type="xsd:positiveInteger" use="required" wblid:cname="Rows"/>
</xsd:complexType>
```

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

### 2.2.3.77 CT\_TopPercent

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Query](#)

Specifies a percentage that limits the percent of records returned as results of a Query (section 2.1.3).

*Attributes:*

**Percent:** An **ST\_Percent** attribute that specifies the number of records to be returned as results, expressed as a percentage. If the Query (section 2.1.3) doesn't include a **CT\_Ordering** (section 2.2.3.3) element, the first **Percent** percent of records are returned. If the Query (section 2.1.3) includes a **CT\_Ordering** (section 2.2.3.3) element the first **Percent** percent of records, as sorted by that ordering, are returned.

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

```
<xsd:complexType name="CT_TopPercent">
  <xsd:attribute name="Percent" use="required" wblid:cname="Percent" type="ST_Percent"/>
</xsd:complexType>
```

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

### 2.2.3.78 CT\_ExpressionArgument

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Action](#)

Specifies an argument of a macro action (section 2.2.5.1) with a single expression.

*Child Elements:*

**Expression:** A **CT\_ExpressionContents** (section 2.2.3.45) element that specifies a single expression as the value of the argument.

*Attributes:*

**Name:** An **ST\_ObjectName** (section 2.2.4.1) attribute that specifies the name of the argument.

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

```
<xsd:complexType name="CT_ExpressionArgument">
  <xsd:sequence>
    <xsd:element name="Expression" type="CT_ExpressionContents" wblld:cname="Expression"/>
  </xsd:sequence>
  <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblld:cname="Name"/>
</xsd:complexType>
```

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

### 2.2.3.79 CT\_Expressions

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_FormDef](#)

Container type for the expressions in a **CT\_FormDef** (section 2.2.3.81).

*Child Elements:*

**Expression:** A **CT\_NamedExpression** (section [2.2.3.86](#)) element that specifies a single expression in a **CT\_FormDef** (section 2.2.3.81).

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

```
<xsd:complexType name="CT_Expressions">
  <xsd:sequence>
    <xsd:element name="Expression" minOccurs="0" maxOccurs="unbounded"
      type="CT_NamedExpression" wblld:cname="Expression"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.80 CT\_EventDataMacro

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [EventDataMacro](#)

Specifies an Event Data Macro (section [2.1.2.2](#)) on a table.

*Child Elements:*

**DataMacro:** A **CT\_DataMacro** element (section [2.2.3.44](#)) that specifies the Event Data Macro (section 2.1.2.2). MUST include the **Event** attribute.

*Attributes:*

**Version:** A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the version number of the Event Data Macro (section 2.1.2.2).

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

```

<xsd:complexType name="CT_EventDataMacro">
  <xsd:sequence>
    <xsd:element name="DataMacro" minOccurs="1" maxOccurs="1" type="CT_DataMacro"
      wblid:cname="DataMacro"/>
  </xsd:sequence>
  <xsd:attribute name="Version" type="xsd:string" wblid:cname="Version" use="optional"/>
</xsd:complexType>

```

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

### 2.2.3.81 CT\_FormDef

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [FormDef](#)

Specifies a form.

*Child Elements:*

**Expressions:** A **CT\_Expressions** (section [2.2.3.79](#)) element that specifies all the expressions embedded in the form.

**Html:** A **string** ([XMLSCHEMA2] section 3.2.1) element that specifies the form and its controls, properties and layout. MUST be present. MUST be a **CDATA section** ([XML] section 2.7) that contains valid **HTML** markup.

**Query:** A **CT\_Query** (section [2.2.3.18](#)) element that specifies a Query (section [2.1.3](#)) to serve as the data source of the form.

**RecordSource:** A **string** ([XMLSCHEMA2] section 3.2.1) element that specifies the name of a Table (section [2.1.1](#)) or Query (section 2.1.3) that is the data source of the form. If the **Query** element is present, **RecordSource** MUST specify the same query.

**UserInterfaceMacros:** A **CT\_UserInterfaceMacros** (section [2.2.3.41](#)) element that specifies all the User Interface Macros embedded in the form.

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

```

<xsd:complexType name="CT_FormDef">
  <xsd:sequence>
    <xsd:element name="RecordSource" type="xsd:string" wblid:cname="RecordSource"
      minOccurs="0"/>
    <xsd:element name="Html" wblid:cname="Html" type="xsd:string"/>
    <xsd:element name="UserInterfaceMacros" wblid:cname="UserInterfaceMacros"
      wblid:codeName="UserInterfaceMacros" type="CT_UserInterfaceMacros" minOccurs="0"/>
    <xsd:element name="Expressions" wblid:cname="Expressions" wblid:codeName="Expressions"
      type="CT_Expressions" minOccurs="0"/>
    <xsd:element name="Query" wblid:cname="Query" wblid:codeName="Query" type="CT_Query"
      minOccurs="0"/>
  </xsd:sequence>
</xsd:complexType>

```

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

### 2.2.3.82 CT\_ExtendedAttribute

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

Referenced by: [CT\\_ExtendedAttributes](#)

Specifies the name and the value of a property of a table or column.

*Attributes:*

**Name:** An **ST\_ObjectName** (section [2.2.4.1](#)) attribute that specifies the name of the property.

**Value:** An **ST\_LongString** (section [2.2.4.4](#)) attribute that specifies the value of the property.

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

```
<xsd:complexType name="CT_ExtendedAttribute" wblid:cname="CT_ExtendedAttribute">
  <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"/>
  <xsd:attribute name="Value" wblid:cname="Value" type="ST_LongString" use="required"/>
</xsd:complexType>
```

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

### 2.2.3.83 CT\_ExtendedAttributes

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

Referenced by: [ExtendedAttributes](#)

Specifies a list of properties of a table or column as name/value pairs.

*Child Elements:*

**ExtendedAttribute:** A **CT\_ExtendedAttribute** (section [2.2.3.82](#)) element that specifies the name and the value of a table or column property.

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

```
<xsd:complexType name="CT_ExtendedAttributes" wblid:cname="CT_ExtendedAttributes">
  <xsd:sequence>
    <xsd:element name="ExtendedAttribute" wblid:cname="ExtendedAttribute"
      type="CT_ExtendedAttribute" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

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

### 2.2.3.84 CT\_DecimalLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

Referenced by: [CT\\_IndexedDecimalLiteral](#), [CT\\_NamedExpression](#), [CT\\_ExpressionContents](#)

Specifies a literal that represents a decimal number in an expression.

*Attributes:*

**Value:** An **ST\_Decimal** (section [2.2.4.14](#)) attribute that specifies the value of the literal.

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



```
<xsd:complexType name="CT_DecimalLiteral">
  <xsd:attribute name="Value" type="ST_Decimal" use="required" wld:cname="Value"/>
</xsd:complexType>
```

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

### 2.2.3.85 CT\_IndexedDecimalLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedFunctionCall](#), [CT\\_FunctionCall](#)

Specifies a literal that represents a decimal number that is an argument to a function call in an expression.

*Attributes:*

**Index:** An [int](#) ([XMLSCHEMA2] section 3.3.17) attribute that specifies the zero-indexed position of the literal in the list of arguments.

**Value:** An [ST\\_Decimal](#) (section [2.2.4.14](#)) attribute that specifies the value of the literal.

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

```
<xsd:complexType name="CT_IndexedDecimalLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_DecimalLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wld:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.86 CT\_NamedExpression

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Expressions](#)

Specifies an expression that has a name associated with it. User Interface Macros (section [2.1.2.1](#)) and controls on the form that are descendants of the same [CT\\_FormDef](#) (section [2.2.3.81](#)) element as the [CT\\_NamedExpression](#) element can reference the expression using the value of the **Name** attribute.

*Child Elements:*

**BitLiteral:** A [CT\\_BitLiteral](#) element that specifies a Boolean literal.

**DateLiteral:** A [CT\\_DateLiteral](#) element that specifies a date literal.

**DateTimeLiteral:** A [CT\\_DateTimeLiteral](#) element that specifies a literal with both date and time components.

**DecimalLiteral:** A [CT\\_DecimalLiteral](#) element that specifies a decimal literal.

**FunctionCall:** A [CT\\_FunctionCall](#) element that specifies a function call.

**Identifier:** A [CT\\_Identifier](#) element that specifies an identifier.

**IntegerLiteral:** A [CT\\_IntegerLiteral](#) element that specifies an integer literal.

**NullLiteral:** A [CT\\_NullLiteral](#) element that specifies a null literal.

**Original:** An Ignored Value (section [2.1.4](#)).

**StringLiteral:** A [CT\\_StringLiteral](#) element that specifies a string literal.

**TimeLiteral:** A [CT\\_TimeLiteral](#) element that specifies a time literal.

*Attributes:*

**Name:** A string ([\[XMLSCHEMA2\]](#) section 3.2.1) attribute that specifies the name of the expression.

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

```
<xsd:complexType name="CT_NamedExpression">
  <xsd:complexContent>
    <xsd:extension base="CT_ExpressionContents">
      <xsd:attribute name="Name" type="xsd:string" wblid:cname="Name" use="required"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

### 2.2.3.87 CT\_PropertyRef

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_PropertyRefIndex](#), [CT\\_ConstraintWithExpression](#), [CT\\_CheckConstraint](#), [CT\\_DefaultConstraint](#), [PropertyRef](#)

Specifies a reference to a column in a table (section [2.1.1](#)).

*Attributes:*

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the referenced column.

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

```
<xsd:complexType name="CT_PropertyRef">
  <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"/>
</xsd:complexType>
```

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

### 2.2.3.88 CT\_PropertyRefIndex

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Index](#), [CT\\_Unique](#)

Specifies a reference to a column that is part of an index (section [2.1.1.3](#)) in a table (section [2.1.1](#)).

*Attributes:*

**Direction:** An **ST\_SortDirection** attribute (section [2.2.4.7](#)) that specifies the sort order of the column in the index (section 2.1.1.3).

**Name:** An **ST\_ObjectName** attribute (section [2.2.4.1](#)) that specifies the name of the referenced column.

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

```
<xsd:complexType name="CT_PropertyRefIndex">
  <xsd:complexContent>
    <xsd:extension base="CT_PropertyRef">
      <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
```

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

## 2.2.4 Simple Types

### 2.2.4.1 ST\_ObjectName

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [BoundColumn](#), [DisplayColumn](#), [DisplayName](#), [InternalName](#), [ObjectId](#), [ReferencedTable](#), [CT\\_Index](#), [CT\\_PropertyRefIndex](#), [CT\\_PropertyRef](#), [CT\\_Unique](#), [CT\\_ConstraintWithExpression](#), [CT\\_CheckConstraint](#), [CT\\_DefaultConstraint](#), [CT\\_ExtendedAttribute](#), [CT\\_Order](#), [CT\\_Reference](#), [CT\\_Parameter](#), [CT\\_Result](#), [CT\\_Join](#), [CT\\_Group](#), [CT\\_ParameterDefinition](#), [CT\\_ParameterValue](#), [CT\\_OutputParameter](#), [CT\\_Query](#), [CT\\_Argument](#), [CT\\_ExpressionArgument](#), [CT\\_Action](#), [CT\\_ForEachRecordData](#), [CT\\_LookupRecordData](#), [CT\\_CreateRecordData](#), [CT\\_EditRecordData](#), [CT\\_UserInterfaceMacro](#)

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies an attribute of an object in a database application. MUST NOT begin with a space character or the '=' character. MUST NOT contain the tab character or any of the following characters: /, \, :, \*, ?, ", <, >, ., |, #, {, }, %, ~, &, ;, !, `, [, ], or any character whose hexadecimal value is less than 0x20. The length of the string MUST NOT exceed 64 characters.

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

```
<xsd:simpleType name="ST_ObjectName">
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="64"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.2 ST\_DataObjectEvent

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

Referenced by: [CT\\_DataMacro](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies the type of event that causes a Data Macro (section 2.1.2.2) to be called.

MUST be one of the following values.

Value	Meaning
AfterInsert	The macro is called after a new record has been added.
AfterUpdate	The macro is called after an existing record has been updated.
AfterDelete	The macro is called after an existing record has been removed.

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

```
<xsd:simpleType name="ST_DataObjectEvent">
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="64"/>
    <xsd:enumeration value="AfterInsert" wblid:cname="AfterInsert"/>
    <xsd:enumeration value="AfterUpdate" wblid:cname="AfterUpdate"/>
    <xsd:enumeration value="AfterDelete" wblid:cname="AfterDelete"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.3 ST\_ShortString

*Target namespace:* http://schemas.microsoft.com/office/accessservices/2010/12/application

Referenced by: [CT\\_CheckConstraint](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that MUST be less than or equal to 255 characters in length.

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

```
<xsd:simpleType name="ST_ShortString">
  <xsd:restriction base="xsd:string">
    <xsd:maxLength value="255"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.4 ST\_LongString

*Target namespace:* http://schemas.microsoft.com/office/accessservices/2010/12/application

Referenced by: [Caption](#), [CT\\_Index](#), [CT\\_Unique](#), [CT\\_ExtendedAttribute](#), [CT\\_Order](#), [CT\\_AdHocOrder](#), [CT\\_Result](#), [CT\\_Join](#), [CT\\_Group](#), [CT\\_ParameterDefinition](#), [CT\\_Argument](#), [CT\\_DataMacroStatements](#),

[CT\\_DataMacroStatementGroup](#), [CT\\_UserInterfaceMacroStatements](#),  
[CT\\_UserInterfaceMacroStatementGroup](#)

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that MUST be less than or equal to 1024 characters in length.

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

```
<xsd:simpleType name="ST_LongString">  
  <xsd:restriction base="xsd:string">  
    <xsd:maxLength value="1024"/>  
  </xsd:restriction>  
</xsd:simpleType>
```

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

### 2.2.4.5 ST\_JoinDirection

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_Join](#)

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the direction of a **CT\_Join** (section 2.2.3.10) in a **CT\_Query** (section [2.2.3.18](#)). MUST be one of the following values.

Value	Meaning
Inner	The join results include data from rows in the left input source and the right input source where the <b>LeftProperty</b> and <b>RightProperty</b> values are equal.
Left Outer	The join results include data from all rows in the left input source along with data from rows in the right input source where the <b>LeftProperty</b> and <b>RightProperty</b> values are equal.
Right Outer	The join results include data from all rows in the right input source along with data from rows in the left input source where the <b>LeftProperty</b> and <b>RightProperty</b> values are equal.

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

```
<xsd:simpleType name="ST_JoinDirection">  
  <xsd:restriction base="xsd:string">  
    <xsd:enumeration value="Inner" wblid:cname="Inner"/>  
    <xsd:enumeration value="Left Outer" wblid:cname="LeftOuter"/>  
    <xsd:enumeration value="Right Outer" wblid:cname="RightOuter"/>  
  </xsd:restriction>  
</xsd:simpleType>
```

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

### 2.2.4.6 ST\_FieldType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [UnderlyingType](#), [CT\\_Parameter](#), [CT\\_ParameterDefinition](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies a data type. MUST be one of the following values.

Value	Meaning
Text	A string value up to 4000 characters in length.
Number	A <b>floating-point number</b> .
Yes/No	A Boolean value.
Currency	A monetary value.
Date/Time	A date value that includes time.
LongText	A string value up to the maximum storage size specified by the <b>nvarchar</b> ([MSDN-TSQL-Ref]) data type.
Date	A date value.
Time	A time value.
Integer	An integer number value.
Decimal	A number value with specified scale and precision, as specified by the <b>decimal</b> data type ([MSDN-TSQL-Ref]).

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

```
<xsd:simpleType name="ST_FieldType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Text" wblid:cname="Text"/>
    <xsd:enumeration value="Number" wblid:cname="Number"/>
    <xsd:enumeration value="Yes/No" wblid:cname="YesNo"/>
    <xsd:enumeration value="Currency" wblid:cname="Currency"/>
    <xsd:enumeration value="Date/Time" wblid:cname="DateTime"/>
    <xsd:enumeration value="LongText" wblid:cname="LongText"/>
    <xsd:enumeration value="Date" wblid:cname="Date"/>
    <xsd:enumeration value="Time" wblid:cname="Time"/>
    <xsd:enumeration value="Integer" wblid:cname="Integer"/>
    <xsd:enumeration value="Decimal" wblid:cname="Decimal"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

#### 2.2.4.7 ST\_SortDirection

*Target namespace:* http://schemas.microsoft.com/office/accessservices/2010/12/application

*Referenced by:* [Direction](#), [CT\\_PropertyRefIndex](#), [CT\\_Order](#), [CT\\_OrderExpression](#), [CT\\_AdHocOrder](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies the direction of an order. MUST be one of the following values.

Value	Meaning
Ascending	The ordering is smallest to largest.

Value	Meaning
Descending	The ordering is largest to smallest.

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

```
<xsd:simpleType name="ST SortDirection">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Ascending" wblid:cname="Ascending"/>
    <xsd:enumeration value="Descending" wblid:cname="Descending"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.8 ST\_TextType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [TextType](#)

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the layout or format of a text column. MUST be one of the following values.

Value	Meaning
SingleLine	A single line of text.
MultipleLines	Multiple lines of text.
Hyperlink	A hyperlink.
Email	An <b>email address</b> .
Person	A person.
Phone	A phone number.
SingleChoiceField	A single selection from a set of values.
MultiChoiceField	Multiple selections from a set of values.

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

```
<xsd:simpleType name="ST TextType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="SingleLine" wblid:cname="SingleLine"/>
    <xsd:enumeration value="MultipleLines" wblid:cname="MultipleLines"/>
    <xsd:enumeration value="Hyperlink" wblid:cname="Hyperlink"/>
    <xsd:enumeration value="Email" wblid:cname="Email"/>
    <xsd:enumeration value="Person" wblid:cname="Person"/>
    <xsd:enumeration value="Phone" wblid:cname="Phone"/>
    <xsd:enumeration value="SingleChoiceField" wblid:cname="SingleChoiceField"/>
    <xsd:enumeration value="MultiChoiceField" wblid:cname="MultiChoiceField"/>
  </xsd:restriction>
</xsd:simpleType>
```

```
</xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.9 TStoreGeneratedPattern

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [StoreGeneratedPattern](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies the type of a column based on the pattern used to generate its value. MUST be one of the following values.

Value	Meaning
None	The column does not have an auto-generated pattern for its values.
Identity	The values of the column are generated such that each record has a unique value in the column.
Computed	The values of the column are generated by evaluating an expression.

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

```
<xsd:simpleType name="TStoreGeneratedPattern" wblid:cname="TStoreGeneratedPattern">
  <xsd:restriction base="xsd:token">
    <xsd:enumeration value="None" wblid:cname="None"/>
    <xsd:enumeration value="Identity" wblid:cname="Identity"/>
    <xsd:enumeration value="Computed" wblid:cname="Computed"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.10 ST\_LookupType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [LookupType](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies the source of the data in a lookup field. MUST be one of the following values.

Value	Meaning
TableOrQuery	The source is a table or a query.
ValueList	The source is a given list of values.

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



```

<xsd:simpleType name="ST_LookupType" wblid:cname="ST_LookupType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="TableOrQuery" wblid:cname="TableOrQuery"/>
    <xsd:enumeration value="ValueList" wblid:cname="ValueList"/>
  </xsd:restriction>
</xsd:simpleType>

```

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

#### 2.2.4.11 ST\_Percent

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_TopPercent](#)

A **float** ([XMLSCHEMA2] section 3.2.4) that specifies a percentage. MUST be greater than or equal to 0 and less than or equal to 100.

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

```

<xsd:simpleType name="ST_Percent">
  <xsd:restriction base="xsd:float">
    <xsd:minExclusive value="0"/>
    <xsd:maxInclusive value="100"/>
  </xsd:restriction>
</xsd:simpleType>

```

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

#### 2.2.4.12 ST\_UserInterfaceObjectEvent

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_UserInterfaceMacro](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies the type of event that causes a macro (section [2.1.2](#)) to be called.

The value MUST be one of the events that is supported by the form or by the type of control that is specified by the **For** attribute of the **CT\_UserInterfaceMacro** (section 2.2.3.43) element.

The following table lists the valid events for form and control types. Any control types not listed have no valid events.

Control type	Valid events
Form	OnLoad, OnCurrent
Text Box / Multiline Textbox	OnClick, AfterUpdate
Button	OnClick
Combo Box	AfterUpdate
Label	OnClick
Image	OnClick

Control type	Valid events
Autocomplete Control	OnClick, AfterUpdate
Check Box	AfterUpdate
Hyperlink Control	OnClick, AfterUpdate

The following table lists the meaning of each event.

Value	Meaning
OnClick	Call the macro after a control is clicked.
onclick	Call the macro after a control is clicked.
AfterUpdate	Call the macro after the content of a control is updated.
afterupdate	Call the macro after the content of a control is updated.
OnCurrent	Call the macro after the current record is changed.
oncurrent	Call the macro after the current record is changed.
OnLoad	Call the macro after a Form is loaded.
onload	Call the macro after a Form is loaded.

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

```
<xsd:simpleType name="ST_UserInterfaceObjectEvent">
  <xsd:restriction base="xsd:string">
    <xsd:minLength value="1"/>
    <xsd:maxLength value="64"/>
    <xsd:enumeration value="OnClick" wblid:cname="OnClick"/>
    <xsd:enumeration value="onclick" wblid:cname="onclick"/>
    <xsd:enumeration value="AfterUpdate" wblid:cname="AfterUpdate"/>
    <xsd:enumeration value="afterupdate" wblid:cname="afterupdate"/>
    <xsd:enumeration value="OnCurrent" wblid:cname="OnCurrent"/>
    <xsd:enumeration value="oncurrent" wblid:cname="oncurrent"/>
    <xsd:enumeration value="OnLoad" wblid:cname="OnLoad"/>
    <xsd:enumeration value="onload" wblid:cname="onload"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.13 ST\_Format

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [Format](#)

Specifies the format type for displaying the data in a column. The actual formatting is implementation-specific.

Value	Meaning
General Number	Column data is a number formatted with the most compact of either fixed-point or scientific notation.
Currency	Column data is a currency value formatted with a currency symbol.
Fixed	Column data is a number, formatted with integral and decimal digits with optional negative sign.
Standard	Column data is a number formatted with integral and decimal digits, group separators, and a decimal separator with optional negative sign.
Percent	Column data is a number formatted as the number multiplied by 100 and displayed with a percent symbol.
General Date	Column data is a date that optionally includes a time.
Long Date	Column data is a long-form date.
Short Date	Column data is a short-form date.
Long Time	Column data is a long-form time.
Short Time	Column data is a short-form time.

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

```
<xsd:simpleType name="ST Format" wblid:cname="ST Format">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="General Number" wblid:cname="GeneralNumber"/>
    <xsd:enumeration value="Currency" wblid:cname="Currency"/>
    <xsd:enumeration value="Fixed" wblid:cname="Fixed"/>
    <xsd:enumeration value="Standard" wblid:cname="Standard"/>
    <xsd:enumeration value="Percent" wblid:cname="Percent"/>
    <xsd:enumeration value="General Date" wblid:cname="GeneralDate"/>
    <xsd:enumeration value="Long Date" wblid:cname="LongDate"/>
    <xsd:enumeration value="Short Date" wblid:cname="ShortDate"/>
    <xsd:enumeration value="Long Time" wblid:cname="LongTime"/>
    <xsd:enumeration value="Short Time" wblid:cname="ShortTime"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

#### 2.2.4.14 ST\_Decimal

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedDecimalLiteral](#), [CT\\_DecimalLiteral](#)

A **decimal** ([\[XMLSCHEMA2\]](#) section 3.2.3) that specifies a number.

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

```
<xsd:simpleType name="ST_Decimal">
  <xsd:restriction base="xsd:decimal">
    <xsd:totalDigits value="28"/>
  </xsd:restriction>
</xsd:simpleType>
```

</xsd:simpleType>

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

#### 2.2.4.15 ST\_DatePartLiteral

Target namespace: <http://schemas.microsoft.com/office/accessservices/2010/12/application>

Referenced by: [CT\\_IndexedDatePartLiteral](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies a date part literal in an expression. MUST be one of the following values.

Value	Meaning
YEAR	Specifies the Year date part.
QUARTER	Specifies the Quarter date part.
MONTH	Specifies the Month date part.
DAYOFYEAR	Specifies the DayOfYear date part.
DAY	Specifies the Day date part.
WEEK	Specifies the Week date part.
WEEKDAY	Specifies the Weekday date part.
HOURL	Specifies the Hour date part.
MINUTE	Specifies the Minute date part.
SECOND	Specifies the Second date part.
MILLISECOND	Specifies the Millisecond date part.
ISO_WEEK	Specifies the ISO_Week date part.

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

```
<xsd:simpleType name="ST_DatePartLiteral">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="YEAR" wblid:cname="YEAR"/>
    <xsd:enumeration value="QUARTER" wblid:cname="QUARTER"/>
    <xsd:enumeration value="MONTH" wblid:cname="MONTH"/>
    <xsd:enumeration value="DAYOFYEAR" wblid:cname="DAYOFYEAR"/>
    <xsd:enumeration value="DAY" wblid:cname="DAY"/>
    <xsd:enumeration value="WEEK" wblid:cname="WEEK"/>
    <xsd:enumeration value="WEEKDAY" wblid:cname="WEEKDAY"/>
    <xsd:enumeration value="HOURL" wblid:cname="HOURL"/>
    <xsd:enumeration value="MINUTE" wblid:cname="MINUTE"/>
    <xsd:enumeration value="SECOND" wblid:cname="SECOND"/>
    <xsd:enumeration value="MILLISECOND" wblid:cname="MILLISECOND"/>
    <xsd:enumeration value="ISO_WEEK" wblid:cname="ISO_WEEK"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

#### 2.2.4.16 ST\_TypeLiteral

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT\\_IndexedTypeLiteral](#)

A **string** ([XMLSCHEMA2] section 3.2.1) that specifies a data type. It MUST be one of the following values.

Value	Meaning
FLOAT	Specifies the Float data type.
INTEGER	Specifies the Integer data type.
CURRENCY	Specifies the Currency data type.
YESNO	Specifies the Yes/No data type.
TEXT	Specifies the Text data type.
SHORTTEXT	Specifies the ShortText data type.
LONGTEXT	Specifies the LongText data type.
DATEWITHTIME	Specifies the DateWithTime data type.
DATE	Specifies the Date data type.
TIME	Specifies the Time data type.

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

```
<xsd:simpleType name="ST_TypeLiteral">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="FLOAT" wblid:cname="FLOAT"/>
    <xsd:enumeration value="INTEGER" wblid:cname="INTEGER"/>
    <xsd:enumeration value="CURRENCY" wblid:cname="CURRENCY"/>
    <xsd:enumeration value="YESNO" wblid:cname="YESNO"/>
    <xsd:enumeration value="TEXT" wblid:cname="TEXT"/>
    <xsd:enumeration value="SHORTTEXT" wblid:cname="SHORTTEXT"/>
    <xsd:enumeration value="LONGTEXT" wblid:cname="LONGTEXT"/>
    <xsd:enumeration value="DATEWITHTIME" wblid:cname="DATEWITHTIME"/>
    <xsd:enumeration value="DATE" wblid:cname="DATE"/>
    <xsd:enumeration value="TIME" wblid:cname="TIME"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

#### 2.2.4.17 ST\_DecimalPlaces

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [DecimalPlaces](#)

Specifies the number of decimal places used to display a numeric value.

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

```
<xsd:simpleType name="ST_DecimalPlaces">
  <xsd:restriction base="xsd:nonNegativeInteger">
    <xsd:minInclusive value="0"/>
    <xsd:maxInclusive value="15"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

### 2.2.4.18 ST\_QuerySourceType

*Target namespace:* <http://schemas.microsoft.com/office/accessservices/2010/12/application>

*Referenced by:* [CT Reference](#)

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the type of the **CT\_Reference** (section 2.2.3.6).

Value	Meaning
Table	Input source is a table.
Query	Input source is a query.

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

```
<xsd:simpleType name="ST_QuerySourceType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Table" wblid:cname="Table"/>
    <xsd:enumeration value="Query" wblid:cname="Query"/>
  </xsd:restriction>
</xsd:simpleType>
```

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

## 2.2.5 Macros

This section specifies the valid values for the **Action** and **Argument** elements of a macro (section [2.1.2](#)).

### 2.2.5.1 Actions

Actions are elements of type **CT\_Action** (section [2.2.3.20](#)). Actions MUST have a **Name** attribute set to the title of one of the following subsections. These actions can be present in either a Data Macro (section [2.1.2.2](#)) or a User Interface Macro (section [2.1.2.1](#)) unless otherwise specified. Child arguments not specified by an action MUST NOT be present in that action. Child arguments specified by a particular action are optional unless otherwise specified.

#### 2.2.5.1.1 ChangeView

Changes the focus from the active form object to a different form object. Parameters to the form, if any, are specified by the **Parameters** element in **CT\_Action** (section [2.2.3.20](#)).

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type can have the following child arguments.

Argument	Meaning
Table (section <a href="#">2.2.5.2.5</a> )	The name of the table that is a data source of the target form. MUST be present.
View (section <a href="#">2.2.5.2.6</a> )	The name of the target form. MUST be present.
Where (section <a href="#">2.2.5.2.15</a> )	An <b>Expression</b> (section <a href="#">2.2.1.10</a> ) used to select the set of records that will be displayed from the data source of the target form.
OrderBy (section <a href="#">2.2.5.2.11</a> )	The ordering used to sort the set of records from the data source of the target form.

### 2.2.5.1.2 CancelRecordChange

Exits the **CT\_CreateRecord** (section [2.2.3.26](#)) or **CT\_EditRecord** (section [2.2.3.28](#)) block with no record change.

MUST NOT be present in a **CT\_DataMacroStatements** (section [2.2.3.38](#)) element unless that element is contained by a **CT\_EditRecord** (section [2.2.3.28](#)) or **CT\_CreateRecord** (section [2.2.3.26](#)) element. MUST NOT be present in a User Interface Macro (section [2.1.2.1](#)).

### 2.2.5.1.3 ClosePopup

Closes the active popup.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

### 2.2.5.1.4 DeleteRecord

If present in a User Interface Macro (section [2.2.1.3](#)), deletes the current record from the data source of the active form (section [2.2.3.81](#)). If present in a Data Macro (section [2.1.2.2](#)), deletes a record based on the argument.

Actions of this type in a Data Macro (section [2.1.2.2](#)) can have the following child argument.

Argument	Meaning
Alias (section <a href="#">2.2.5.2.1</a> )	The data source from which the record is to be deleted. If this argument is not present, the current record is deleted.

### 2.2.5.1.5 EditRecord

Sets the current record to edit mode.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

### 2.2.5.1.6 ExitForEachRecord

Exits a running **CT\_ForEachRecord** (section [2.2.3.22](#)) loop.

MUST NOT be present in any element except a **CT\_DataMacroStatements** (section [2.2.3.38](#)) that is contained by a **CT\_ForEachRecord** (section [2.2.3.22](#)) element. MUST NOT be present in a User Interface Macro (section [2.1.2.1](#)).

### 2.2.5.1.7 GoToControl

Sets the focus to a control on the active form (section [2.2.3.81](#)).

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type can have the following child argument.

Argument	Meaning
ControlName (section <a href="#">2.2.5.2.2</a> )	The name of the control to which the focus will be set. MUST be present.

### 2.2.5.1.8 GoToRecord

Sets the current record in the active form.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type can have the following child argument.

Argument	Meaning
Record (section <a href="#">2.2.5.2.13</a> )	The record that will become current.

### 2.2.5.1.9 MessageBox

Launches a modal dialog box that displays a message.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type MUST have the following child argument.

Argument	Meaning
Message (section <a href="#">2.2.5.2.8</a> )	The message to be displayed in the dialog box. MUST be present.

### 2.2.5.1.10 OpenPopup

Opens a form. Parameters to that form are specified by the **Parameters** element in **CT\_Action** (section [2.2.3.20](#)).

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type can have the following child arguments.



Argument	Meaning
View (section <a href="#">2.2.5.2.6</a> )	The name of the form to open. MUST be present.
Where (section <a href="#">2.2.5.2.15</a> )	An <b>Expression</b> (section <a href="#">2.2.1.10</a> ) that is used to select a set of records from the data source of the target form.
OrderBy (section <a href="#">2.2.5.2.11</a> )	The order used to sort the set of records from the data source of the target form.

### 2.2.5.1.11 RaiseError

Generates an error message.

MUST NOT be present in a User Interface Macro (section [2.1.2.1](#)).

Actions of this type can have the following child argument.

Argument	Meaning
Description (section <a href="#">2.2.5.2.3</a> )	The description of the error.

### 2.2.5.1.12 RequeryRecords

Refreshes the data displayed by the active form by querying its data source again.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type can have the following child arguments.

Argument	Meaning
Where (section <a href="#">2.2.5.2.15</a> )	An <b>Expression</b> (section <a href="#">2.2.1.10</a> ) that is used to select a set of records from the data source of the active form.
OrderBy (section <a href="#">2.2.5.2.11</a> )	The order used to sort the set of records from the data source of the target form.

### 2.2.5.1.13 RunDataMacro

Calls a named Data Macro (section [2.1.2.2](#)). Parameters to the invoked macro are specified by the **Parameters** element in the **CT\_Action** (section [2.2.3.20](#)) element that specifies the **RunDataMacro** action.

MUST NOT be present in a **CT\_DataMacroStatements** (section [2.2.3.38](#)) element that is contained by a **CT\_EditRecord** (section [2.2.3.28](#)) or **CT\_CreateRecord** (section [2.2.3.26](#)) element.

Actions of this type can have the following child argument.

Argument	Meaning
MacroName (section <a href="#">2.1.2.2</a> )	The name of the Data Macro (section <a href="#">2.1.2.2</a> ) to be run. MUST be present.

Argument	Meaning
<a href="#">2.2.5.2.7</a> )	

#### 2.2.5.1.14 RunMacro

Runs a named User Interface Macro (section [2.1.2.1](#)).

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type MUST have the following child argument.

Argument	Meaning
MacroName (section <a href="#">2.2.5.2.7</a> )	The name of the User Interface Macro (section <a href="#">2.1.2.1</a> ) to be run. MUST be present.

#### 2.2.5.1.15 SaveRecord

Saves the current record.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

#### 2.2.5.1.16 SetField

Changes the value of a field in the current record.

MUST NOT be present in a **CT\_DataMacroStatements** (section [2.2.3.38](#)) element unless that element is contained by a **CT\_CreateRecord** (section [2.2.3.26](#)) or **CT\_EditRecord** (section [2.2.3.28](#)) element. MUST NOT be present in a User Interface Macro (section [2.1.2.1](#)).

Actions of this type can have the following child arguments.

Argument	Meaning
Field (section <a href="#">2.2.5.2.4</a> )	The name of the field in the record that will be updated. MUST be present.
Value (section <a href="#">2.2.5.2.14</a> )	The new value for the target field in the record. MUST be present.

#### 2.2.5.1.17 SetLocalVar

Sets the value of a local variable (section [2.1.2.3.2](#)). Creates the variable if it hasn't been created already.

MUST NOT be present in a User Interface Macro (section [2.1.2.1](#)).

Actions of this type MUST have the following child arguments.

Argument	Meaning
Name (section <a href="#">2.2.5.2.9</a> )	The name of the local variable (section <a href="#">2.1.2.3.2</a> ). MUST be present.
Value (section <a href="#">2.2.5.2.14</a> )	The new value of the local variable (section <a href="#">2.1.2.3.2</a> ). MUST be present.

Argument	Meaning
<a href="#">2.2.5.2.14</a> )	

### 2.2.5.1.18 SetProperty

Sets the value of a property for a control.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type can have the following child arguments.

Argument	Meaning
ControlName (section <a href="#">2.2.5.2.2</a> )	The name of the control on which to set the property. If this argument is not present, the property is set for the active object.
Property (section <a href="#">2.2.5.2.12</a> )	The name of the property to be set. MUST be present.
Value (section <a href="#">2.2.5.2.14</a> )	The new value of the property.

### 2.2.5.1.19 SetReturnVar

Sets the value of a return variable (section [2.1.2.3.3](#)). Creates the return variable (section [2.1.2.3.3](#)) if it hasn't been created yet.

MUST NOT be present in a User Interface Macro (section [2.1.2.1](#)).

Actions of this type can have the following child arguments.

Argument	Meaning
Name (section <a href="#">2.2.5.2.9</a> )	The name of the return variable. MUST be present.
Value (section <a href="#">2.2.5.2.14</a> )	The new value of the return variable (section <a href="#">2.1.2.3.3</a> ) in a Data Macro (section <a href="#">2.1.2.2</a> ). MUST be present.

### 2.2.5.1.20 SetVariable

Sets the value of a user interface macro variable (section [2.1.2.3.1](#)). Creates the variable if it hasn't been created yet.

MUST NOT be present in a Data Macro (section [2.1.2.2](#)).

Actions of this type MUST have the following child arguments.

Argument	Meaning
Variable (section <a href="#">2.2.5.2.10</a> )	The name of the user interface macro variable (section 2.1.2.3.1). MUST be present.
Value (section <a href="#">2.2.5.2.14</a> )	The new value of the user interface macro variable (section 2.1.2.3.1). MUST be present.

### 2.2.5.1.21 StopMacro

Stops the currently running macro (section [2.1.2](#)).

## 2.2.5.2 Arguments

Arguments are elements of type **CT\_Argument** (section [2.2.3.19](#)) or **CT\_ExpressionArgument** (section [2.2.3.78](#)) that exist as child elements of a **CT\_Action** (section [2.2.3.20](#)) element. The **Name** attribute of the element MUST be the title of one of the following subsections.

### 2.2.5.2.1 Alias

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a data source. The value of this argument corresponds to the **Alias** attribute of **CT\_ForEachRecordData** (section [2.2.3.21](#)) or **CT\_LookupRecordData** (section [2.2.3.23](#)).

Applies to: **DeleteRecord** (section [2.2.5.1.4](#))

### 2.2.5.2.2 ControlName

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a control. The value MUST conform to the restrictions specified by **ST\_ObjectName** (section 2.2.4.1).

Applies to: **GoToControl** (section [2.2.5.1.7](#)), **SetProperty** (section [2.2.5.1.18](#))

### 2.2.5.2.3 Description

Specifies the description of an error. MUST be a **CT\_Argument** (section [2.2.3.19](#)) or a **CT\_ExpressionArgument** (section [2.2.3.78](#)).

Applies to: **RaiseError** (section [2.2.5.1.11](#))

### 2.2.5.2.4 Field

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a field.

Applies to: **SetField** (section [2.2.5.1.16](#))

### 2.2.5.2.5 Table

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a table. The value MUST conform to the restrictions specified by **ST\_ObjectName** (section [2.2.4.1](#)).

Applies to: **ChangeView** (section [2.2.5.1.1](#))

### 2.2.5.2.6 View

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a form. The value MUST conform to the restrictions specified by **ST\_ObjectName** (section [2.2.4.1](#)).

Applies to: **ChangeView** (section [2.2.5.1.1](#)), **OpenPopup** (section [2.2.5.1.10](#))

### 2.2.5.2.7 MacroName

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a Macro. The value MUST conform to the restrictions specified by **ST\_ObjectName** (section [2.2.4.1](#)).

Applies to: **RunDataMacro** (section [2.2.5.1.13](#)), **RunMacro** (section [2.2.5.1.14](#))

### 2.2.5.2.8 Message

Specifies text that is at most 255 characters in length. MUST be a **CT\_Argument** (section [2.2.3.19](#)) or a **CT\_ExpressionArgument** (section [2.2.3.78](#)).

Applies to: **MessageBox** (section [2.2.5.1.9](#))

### 2.2.5.2.9 Name

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a variable.

Applies to: **SetLocalVar** (section [2.2.5.1.17](#)), **SetReturnVar** (section [2.2.5.1.19](#))

### 2.2.5.2.10 Variable

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies the name of a variable.

Applies to: **SetVariable** (section [2.2.5.1.20](#))

### 2.2.5.2.11 OrderBy

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies a sort order. MUST be **XML** that specifies a **CT\_AdHocOrdering** (section [2.2.3.5](#)) element.

Applies to: **ChangeView** (section [2.2.5.1.1](#)), **OpenPopup** (section [2.2.5.1.10](#)), **RequeryRecords** (section [2.2.5.1.12](#))

### 2.2.5.2.12 Property

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies a property on a control. MUST be one of the following values.

Value	Meaning
BackColor	Specifies the background color of a control.
Caption	Specifies the caption attribute of a control.
Enabled	Specifies whether a control is enabled.
ForeColor	Specifies the foreground color of a control.
Value	Specifies the value displayed by a control.
Visible	Specifies whether a control is enabled.

Applies to: **SetProperty** (section [2.2.5.1.18](#))

### 2.2.5.2.13 Record

A **string** ([\[XMLSCHEMA2\]](#) section 3.2.1) that specifies a record in the data source. MUST be one of the following values.

Value	Meaning
First	The first record in the data source.
Last	The last record in the data source.
Next	The record following the current record in the data source.
Previous	The record prior to the current record in the data source.

Applies to: **GoToRecord** (section [2.2.5.1.8](#))

### 2.2.5.2.14 Value

Specifies the value to be assigned to a field, variable or property.

When present in a **SetVariable** (section [2.2.5.1.20](#)), **SetField** (section [2.2.5.1.16](#)), **SetLocalVar** (section [2.2.5.1.17](#)), or **SetReturnVar** (section [2.2.5.1.19](#)) action, this argument MUST be a **CT\_ExpressionArgument** (section [2.2.3.78](#)). When present in a **SetProperty** (section [2.2.5.1.18](#)) action, this argument MUST be a **CT\_Argument** (section [2.2.3.19](#)) or a **CT\_ExpressionArgument** (section [2.2.3.78](#)).

Applies to: **SetVariable** (section [2.2.5.1.20](#)), **SetField** (section [2.2.5.1.16](#)), **SetLocalVar** (section [2.2.5.1.17](#)), **SetReturnVar** (section [2.2.5.1.19](#)), **SetProperty** (section [2.2.5.1.18](#))

### 2.2.5.2.15 Where

A **CT\_ExpressionArgument** (section [2.2.3.78](#)) that specifies an expression that is used to select a set of records from the data source of an object.

Applies to: **ChangeView** (section [2.2.5.1.1](#)), **OpenPopup** (section [2.2.5.1.10](#)), **RequeryRecords** (section [2.2.5.1.12](#))

## 3 Structure Examples

This section contains valid examples for defining different objects in a data application.

### 3.1 Tables

The following section contains a complete and valid example of a table (section [2.1.1](#)) in a data application.

```
<Schema Namespace="Access.Store"
  xmlns="http://schemas.microsoft.com/ado/2008/09/edm"
  xmlns:axl="http://schemas.microsoft.com/office/accessservices/2010/12/application"
  >
  <EntityContainer Name="AccessStoreContainer">
    <EntitySet Name="Tasks"
      EntityType="Access.Store.Tasks"/>
    <AssociationSet Name="FK_Tasks_A702819E-F124-4AB6-92C7-CE90E2460A89"
      Association="Access.Store.FK_Tasks_A702819E-F124-4AB6-92C7-CE90E2460A89">
      <End EntitySet="Employees"/>
      <End EntitySet="Tasks"/>
    </AssociationSet>
  </EntityContainer>
  <EntityType Name="Tasks">
    <Key>
      <PropertyRef Name="ID"/>
    </Key>
    <Property Name="ID"
      Type="Int32"
      axl:StoreGeneratedPattern="Identity"
      axl:ObjectId="ID"
      axl:Caption="ID"
      Nullable="false"/>
    <Property Name="TaskTitle"
      Type="String"
      Unicode="true"
      axl:TextType="SingleLine"
      axl:ObjectId="TaskTitle"
      MaxLength="220"
      axl:Caption="Task Title"
      Nullable="false"/>
    <Property Name="Description"
      Type="String"
      Unicode="true"
      axl:TextType="MultipleLines"
      axl:ObjectId="Description"
      MaxLength="Max"
      axl:Caption="Description"/>
    <Property Name="DueDate"
      Type="DateTime"
      axl:UnderlyingType="Date"
      axl:ObjectId="DueDate"
      axl:Format="Short Date"
      axl:Caption="Due Date"/>
    <Property Name="PercentComplete"
      Type="Double"
      axl:ObjectId="PercentComplete"
      axl:Caption="Percent Complete"
      Nullable="false"/>
    <Property Name="Assigned To"
      Type="Int32"
      axl:ObjectId="Assigned To"
      axl:Description="Each task is assigned to someone. This field creates a
relationship between the task and the person record that owns it."
      axl:LookupType="TableOrQuery"
      axl:ReferencedTable="Employees"
      axl:BoundColumn="ID"
```

```

        axl:DisplayColumn="DisplayNameFirstLast"
        axl:Direction="Ascending"/>
<axl:Index axl:Name="IX_Tasks_B7A69FCF-4725-49DD-9F66-186800A000BF"
        axl:ObjectId="IX_Tasks_B7A69FCF-4725-49DD-9F66-186800A000BF"
        axl:Caption="Assigned To">
    <axl:PropertyRef Name="Assigned To"
        Direction="Ascending"/>
</axl:Index>
<axl:DefaultConstraint
    axl:Name="DF_Tasks_37091DC8-3C38-4FD5-B24F-68517DCD5535">
    <axl:PropertyRef Name="DueDate"/>
    <axl:Expression>
        <axl:Original>Today()</axl:Original>
        <axl:FunctionCall Name="Today"/>
    </axl:Expression>
</axl:DefaultConstraint>
<axl:CheckConstraint axl:Name="CK_Tasks_1948FC46-FB42-4C23-9717-7BD6D587EA7F"
    axl:CheckData="false"
    axl:Message="Due date cannot bet set to a date earlier than today.">
    <axl:PropertyRef Name="DueDate"/>
    <axl:Expression>
        <axl:Original>[DueDate]>>=Today()</axl:Original>
        <axl:FunctionCall Name=">>=">
            <axl:Identifier Name="DueDate"
                Index="0"/>
            <axl:FunctionCall Name="Today"
                Index="1"/>
        </axl:FunctionCall>
    </axl:Expression>
</axl:CheckConstraint>
<axl:EventDataMacro>
    <axl:DataMacro Event="AfterInsert"/>
</axl:EventDataMacro>
<axl:EventDataMacro>
    <axl:DataMacro Event="AfterUpdate"/>
</axl:EventDataMacro>
<axl:EventDataMacro>
    <axl:DataMacro Event="AfterDelete"/>
</axl:EventDataMacro>
<axl:ExtendedAttributes>
    <axl:ExtendedAttribute Name="NounID"
        Value="56d3a7db-f3c4-41fc-912d-f0ce3e4d5cbb"/>
    <axl:ExtendedAttribute Name="SingularName"
        Value="Task"/>
</axl:ExtendedAttributes>
</EntityType>
<Association Name="FK_Tasks_A702819E-F124-4AB6-92C7-CE90E2460A89"
    axl:ObjectId="FK_Tasks_A702819E-F124-4AB6-92C7-CE90E2460A89">
    <End Type="Access.Store.Employees"
        Role="Employees"
        Multiplicity="1"/>
    <End Type="Access.Store.Tasks"
        Role="Tasks"
        Multiplicity="*">
    <OnDelete Action="None"/>
</End>
<ReferentialConstraint>
    <Principal Role="Employees">
        <PropertyRef Name="ID"/>
    </Principal>
    <Dependent Role="Tasks">
        <PropertyRef Name="Assigned To"/>
    </Dependent>
</ReferentialConstraint>
</Association>
</Schema>

```



This protocol is used in conjunction with the Conceptual Schema Definition File Format ([\[MC-CSDL\]](#)) to describe the properties of the table schema.

The `TaskTitle` column is defined by the **Property** element with the **Name** attribute value equal to `TaskTitle`. The **axl:TextType** attribute specifies that the text format of the column is a single line of text. The **axl:Caption** attribute defines the label text as `Task Title`.

The `DueDate` column is defined by the **Property** element with the **Name** attribute value equal to `DueDate`. The **axl:Format** attribute specifies that the date value is formatted as a `Short Date`.

The `Assigned To` column is a lookup field defined by the **Property** element with the **Name** attribute value equal to `Assigned To`. The **axl:Description** attribute provides descriptive text for the field. The **axl:LookupType** attribute is set to **TableOrQuery**, which means this field is getting its values from another table or query. The **axl:ReferencedTable** attribute specifies that this field is getting its values from the `Employees` table. The **axl:BoundColumn** attribute specifies that the field will store values from the `ID` field in `Employees` table, and the **axl:DisplayColumn** attribute specifies that the field will display values from the `DisplayNameFirstLast` field in the `Employees` table.

The **axl:Index** element specifies that there is an index on the `Assigned To` field in the `Tasks` table.

The **axl:DefaultConstraint** element specifies the default value of the `DueDate` field. It is an expression using the `Today()` function that returns the current date value.

The **axl:CheckConstraint** element defines the validation rule for the `DueDate` field. The expression is set to `[DueDate] >= Today()`, which validates that the values entered for the field are greater than or equal to the current date.

The **axl:EventDataMacro** elements are all empty, which signifies that the `Tasks` table does not define any Data Macros (section [2.1.2.2](#)).

The **Association** and **AssociationSet** elements specify a relationship between the `Tasks` table and the `Employees` table. For more information about these elements, see [MC-CSDL] section [2.1.8](#) and [MC-CSDL] section [2.1.18](#).

## 3.2 Forms

The following section contains an example of forms in data applications.

```
<FormDef xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">
  <Html>
    <![CDATA[<?xml version="1.0" encoding="UTF-8"?>
      <html lang="en-us" dir="ltr">
        ...
      </html>]]>
  </Html>
</FormDef>
```

The **Html** element specifies the HTML of the form web page. Note that the majority of the HTML content has been removed from this example for brevity.

## 3.3 UI Macros

The following subsections contain complete and valid examples of UI Macros in data applications.

### 3.3.1 Validation and Exceptions

The following example demonstrates the use of a User Interface Macro (section [2.1.2.1](#)) to display detailed customer information from a form that is viewing the orders of multiple customers.

```
<?xml version="1.0" encoding="utf-16" standalone="no"?>
<UserInterfaceMacros
  xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">

  <UserInterfaceMacro For="DetailButton" Event="onclick">
    <Statements>
      <Action Name="OpenPopup">
        <Argument Name="View">CustomerDetails</Argument>
        <ExpressionArgument Name="Where">
          <Expression>
            <Original>[ID]=[View].[CustomerIDCombobox]</Original>
            <FunctionCall Name="=">
              <Identifier Name="ID" Index="0"/>
              <Identifier Name="View.CustomerIDCombobox" Index="1"/>
            </FunctionCall>
          </Expression>
        </ExpressionArgument>
      </Action>
    </Statements>
  </UserInterfaceMacro>

</UserInterfaceMacros>
```

This sample contains an embedded User Interface Macro that opens the "CustomerDetails" form in a new window using the **OpenPopup** (section [2.2.5.1.10](#)) action. The "CustomerDetails" form will display a record where the **ID** field matches the value from the "CustomerIDCombobox" control of the current form.

The **UserInterfaceMacro** element (section [2.2.1.5](#)) defines the macro. It is triggered by the "OnClick" event of the "DetailButton" command button of the form that contains it, as specified by the **Event** and **For** attributes, respectively.

### 3.3.2 Standalone

The following example describes a standalone User Interface Macro (section [2.1.2.1](#)) named ShowCustomerDetails. Its behavior when called is the same as that of the previous example.

```
<UserInterfaceMacro
  xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">
  <Statements>
    <Action Name="OpenPopup">
      <Argument Name="View">CustomerDetails</Argument>
      <ExpressionArgument Name="Where">
        <Expression>
          <Original>[ID]=[View].[CustomerIDCombobox]</Original>
          <FunctionCall Name="=">
            <Identifier Name="ID" Index="0"/>
            <Identifier Name="View.CustomerIDCombobox" Index="1"/>
          </FunctionCall>
        </Expression>
      </ExpressionArgument>
    </Action>
  </Statements>
</UserInterfaceMacro>
```

The standalone macro can be called from a command button by specifying the following **UserInterfaceMacros** (section [2.2.1.3](#)) element:

```

<UserInterfaceMacros
xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">
  <UserInterfaceMacro For="DetailButton" Event="onclick">
    <Statements>
      <Action Name="RunMacro">
        <Argument Name="MacroName">ShowCustomerDetails</Argument>
      </Action>
    </Statements>
  </UserInterfaceMacro>
</UserInterfaceMacros>

```

The **Argument** element specifies that the "ShowCustomerDetails" macro is called when the command button named "DetailButton" is clicked.

### 3.4 Data Macros

The following examples contain complete and valid examples of Data Macros (section [2.1.2.2](#)) in data applications.

#### 3.4.1 Validate Delete

The following example shows a Data Macro (section [2.1.2.2](#)) that prevents the user from deleting a record in the Tasks table if the task has not been finished. A task is finished when the value in the **PercentComplete** field of the table equals 100. The macro also specifies an error to display to the user if the user attempts to delete an unfinished task.

```

<?xml version="1.0" encoding="utf-16" standalone="no"?>
<DataMacros xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">

  <DataMacro Event="AfterDelete">
    <Statements>
      <ConditionalBlock>
        <If>
          <Condition>
            <Expression>
              <Original>[PercentComplete]&lt;100</Original>
              <FunctionCall Name="&lt;";"
                <Identifier Name="PercentComplete" Index="0"/>
                <IntegerLiteral Value="100" Index="1"/>
              </FunctionCall>
            </Expression>
          </Condition>
          <Statements>
            <Action Name="RaiseError">
              <Argument Name="Description">This task cannot be deleted until it has been
finished</Argument>
            </Action>
          </Statements>
        </If>
      </ConditionalBlock>
    </Statements>
  </DataMacro>

</DataMacros>

```

This macro exists in the context of the Tasks table. The **Condition** element specifies an expression, "[PercentComplete] < 100". If the expression evaluates to true — that is, if the value of the **PercentComplete** field in the row about to be deleted is less than 100 — then the commands in the **Statements** element will be performed. "[PercentComplete]" in this example refers to the field in Tasks. The only command is the **RaiseError** (section [2.2.5.1.11](#)) action, which will generate an

application error and display a dialog box to the user with the following message: "This task cannot be deleted until it has been finished".

### 3.4.2 After Insert

This Data Macro (section [2.1.2.2](#)) example demonstrates how to increment the value of the **CurrentTaskCount** field in the "Users" table after a new record is added and assigned to that user in the "Tasks" table. The **DataMacro** element is a child of a **CT\_DataMacros** (section [2.2.3.42](#)).

```
<?xml version="1.0" encoding="UTF-16" standalone="no"?>
<DataMacros xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">

  <DataMacro Event="AfterInsert">
    <Statements>

      <LookupRecord>
        <Data>
          <Reference>Users</Reference>
          <WhereCondition>
            <Expression>
              <Original>[ID]=[Tasks].[Assigned To]</Original>
              <FunctionCall Name="=">
                <Identifier Name="ID" Index="0"/>
                <Identifier Name="Tasks.Assigned To" Index="1"/>
              </FunctionCall>
            </Expression>
          </WhereCondition>
        </Data>

        <Statements>
          <EditRecord>
            <Data/>
            <Statements>
              <Action Name="SetField">
                <Argument Name="Field">Users.CurrentTaskCount</Argument>
                <ExpressionArgument Name="Value">
                  <Expression>
                    <Original>[Users].[CurrentTaskCount]+1</Original>
                    <FunctionCall Name="+">
                      <Identifier Name="Users.CurrentTaskCount" Index="0"/>
                      <IntegerLiteral Value="1" Index="1"/>
                    </FunctionCall>
                  </Expression>
                </ExpressionArgument>
              </Action>
            </Statements>
          </EditRecord>
        </Statements>
      </LookupRecord>

    </Statements>
  </DataMacro>
</DataMacros>
```

This macro exists in the context of the "Tasks" table. The **Event** attribute of **CT\_DataMacro** (section [2.2.3.44](#)) is set to **AfterInsert**, as specified by **ST\_DataObjectEvent** (section [2.2.4.2](#)), which means that this macro will be run after a record is added to "Tasks". The **Data** child element of **CT\_LookupRecord** (section [2.2.3.24](#)) specifies a set of records from the "Users" table. The **EditRecord** element specifies that the **SetField** action (section [2.2.5.1.16](#)) will be performed on all records specified by the **Data** element, in this case the named context from the **LookupRecord.Data** element. The **Field** (section [2.2.5.2.4](#)) argument specifies that the field to be updated is

"Users.CurrentTaskCount", and the **Value** (section [2.2.5.2.14](#)) argument specifies that the new value of the field is its current value plus 1.

### 3.4.3 Named Macro

This Data Macro (section [2.1.2.2](#)) represents another way of incrementing the "CurrentTaskCount" field of the "Users" list.

```
<?xml version="1.0" encoding="utf-16" standalone="no"?>
<DataMacros xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">
  <DataMacro>
    <Parameters>
      <Parameter Name="UserID" Type="Integer"/>
    </Parameters>
    <Statements>
      <LookUpRecord>
        <Data>
          <Reference>Users</Reference>
          <WhereCondition>
            <Expression>
              <Original>[Users].[ID]=[UserID]</Original>
              <FunctionCall Name="=">
                <Identifier Name="Users.ID" Index="0"/>
                <Identifier Name="UserID" Index="1"/>
              </FunctionCall>
            </Expression>
          </WhereCondition>
        </Data>
      </LookUpRecord>
      <Statements>
        <EditRecord>
          <Data/>
          <Statements>
            <Action Name="SetField">
              <Argument Name="Field">Users.CurrentTaskCount</Argument>
              <ExpressionArgument Name="Value">
                <Expression>
                  <Original>[Users].[CurrentTaskCount]+1</Original>
                  <FunctionCall Name="+">
                    <Identifier Name="Users.CurrentTaskCount" Index="0"/>
                    <IntegerLiteral Value="1" Index="1"/>
                  </FunctionCall>
                </Expression>
              </ExpressionArgument>
            </Action>
          </Statements>
        </EditRecord>
      </Statements>
    </LookUpRecord>
  </Statements>
</DataMacro>
</DataMacros>
```

The first **DataMacro** element is designed to be called from other macros. Its behavior when called is the same as that of the previous example. It also specifies a **Parameters** element (section [2.2.3.12](#)), with the **Name** attribute of `UserID`. The value of the parameter can then be used by referencing the parameter name, as demonstrated in the **Data.WhereCondition** element, which sets a filter on the records retrieved by the **Data** element to include only those where the value of `Users.ID` is equal to the value of the parameter passed in by the calling macro.

The following **DataMacro** element, which is associated with `Tasks`, is an example of how to call a Named Data Macro (section [2.1.2.2](#)). Its **Event** attribute is set to **AfterInsert**, which is called after a new record is added to the `Tasks` table.

```
<DataMacro Event="AfterInsert">
```

```

<Statements>
  <Action Name="RunDataMacro">
    <Argument Name="MacroName">IncrementTaskCount</Argument>
    <Parameters>
      <Parameter Name="UserID">
        <Expression>
          <Original>[Assigned To]</Original>
          <Identifier Name="Assigned To"/>
        </Expression>
      </Parameter>
    </Parameters>
  </Action>
</Statements>
</DataMacro>

```

The **RunDataMacro** (section [2.2.5.1.13](#)) action takes the **MacroName** (section [2.2.5.2.7](#)) argument, the value of which is `IncrementTaskCount`. The **Parameter** element specifies an **Expression** (section [2.2.1.10](#)) element, which evaluates to the value of the `AssignedTo` field in the newly added record in `Tasks`. For example, if the newly added record were assigned to a user with an `ID` of 5, then the `IncrementTaskCount` Data Macro (section [2.1.2.2](#)) would be called with a value of 5 for the `UserID` parameter, and the **WhereCondition** element of the macro would evaluate to `[ID]=5`.

## 3.5 Queries

The following examples contain complete and valid examples of Queries (section [2.1.3](#)).

### 3.5.1 Single Reference Query

The following example shows a Query (section [2.1.3](#)) that references a single table called `Issues`. The purpose of this query is to return all **Summary**, **Status** and **DueDate** fields of the records from the `Issues` table, containing unique selected field values, in descending order of the **DueDate** field, that meet the following criteria:

1. The issue is not closed.
2. The priority value is less than 3.

#### SQL:

```

SELECT DISTINCT [Issues].[Summary], [Issues].[Status], [Issues].[DueDate]
FROM [dbo].[Issues]
WHERE [Issues].[Status] <> N'Closed' AND [Issues].[Priority] < N'3'

```

#### Query AXL:

```

<?xml version="1.0" encoding="utf-8"?>
<Query Distinct="true"
xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">
  <References>
    <Reference Source="Issues"></Reference>
  </References>
  <Results>
    <Property Source="Issues" Name="Summary"></Property>
    <Property Source="Issues" Name="Status"></Property>
    <Property Source="Issues" Name="DueDate"></Property>
  </Results>

```

```

<Restriction>
  <Expression>
    <Original>(((Issues.Status)&lt;&gt;"Closed") AND ((Issues.Priority)&lt;"3"))</Original>
    <FunctionCall Name="And">
      <FunctionCall Name="&lt;&gt;" Index="0">
        <Identifier Name="Issues.Status" Index="0"></Identifier>
        <StringLiteral Value="Closed" Index="1"></StringLiteral>
      </FunctionCall>
      <FunctionCall Name="&lt;" Index="1">
        <Identifier Name="Issues.Priority" Index="0"></Identifier>
        <StringLiteral Value="3" Index="1"></StringLiteral>
      </FunctionCall>
    </FunctionCall>
  </Expression>
</Restriction>

<Ordering>
  <Order Direction="Descending" Source="Issues" Name="DueDate"></Order>
</Ordering>

</Query>

```

The **Distinct** attribute in the **Query** element specifies that the query will return only unique values. If the attribute were "false" or not present, the query would return all values.

The **References** element specifies that the "Issues" table is the data source for this query.

The **Results** element specifies that the query will return the fields "Summary", "Status" and "DueDate" from the "Issues" table.

The **Restriction** element specifies an expression that selects only those records where the values of the "Status" field do not equal "Closed" and the "Priority" field of the issue is less than 3.

The **Ordering** element specifies that the results are sorted in descending order based on the "DueDate" field.

### 3.5.2 Multiple Reference Query with Join

The following example is a Query (section [2.1.3](#)) that joins two tables to produce a result.

The purpose of this query is to return the total number of issues for each customer. The query references two tables, `Customers` and `Issues`. It performs a left outer join between the `Customers` table on the left and `Issues` table on the right. The result set is grouped by the `DisplayName` field from the `Customers` table and the number of issues is returned.

#### SQL:

```

SELECT [Customers].[DisplayName], COUNT([Issues].[ID]) AS [CountOfID]
FROM [dbo].[Customers]
LEFT OUTER JOIN [dbo].[Issues] ON [Customers].[ID] = [Issues].[For Customer]
GROUP BY [Customers].[DisplayName]

```

#### Query AXL:

```

<?xml version="1.0" encoding="utf-8"?>
<Query xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application">

  <References>
    <Reference Source="Customers"></Reference>
    <Reference Source="Issues"></Reference>

```

```

</References>

<Results>
  <Property Source="Customers" Name="DisplayName"></Property>
  <Property Alias="CountOfID">
    <Expression>
      <Original>Count (Issues.ID)</Original>
      <FunctionCall Name="Count">
        <Identifier Name="Issues.ID" Index="0"></Identifier>
      </FunctionCall>
    </Expression>
  </Property>
</Results>

<Joins>
  <Join Type="Left Outer" Left="Customers" LeftProperty="ID" Right="Issues"
RightProperty="For Customer"></Join>
</Joins>

<Groups>
  <Group Source="Customers" Name="DisplayName"></Group>
</Groups>
</Query>

```

The **References** element (section [2.2.3.7](#)) of the **Query** element (section [2.2.1.1](#)) specifies that the query is using `Customers` and `Issues` as source tables.

The **Results** element (section [2.2.3.9](#)) specifies that the return fields will be `Customers.DisplayName` and the count of `Issues.ID`. The second **Property** element under the **Results** element specifies the expression that returns the count of the number of rows that have a value for `Issues.ID`.

The **Joins** element (section [2.2.3.11](#)) specifies the join relationship. The `Customers` and `Issues` tables are joined by `Customers.ID` and `Issues.[For Customer]`. The **Type** attribute specifies the type of join between the tables. The **Left** attribute specifies the left table of the join. The **Right** attribute specifies the right table of the join.

The **Groups** element (section [2.2.3.74](#)) specifies that the query will group the result set by the `Customers.DisplayName` field.



## **4 Security**

### **4.1 Security Considerations for Implementers**

None.

### **4.2 Index of Security Fields**

None.

## 5 Appendix A: Full XML Schema

For ease of implementation, this section provides the full XML Schema to which the Access Application Transfer Protocol Structure Version 2 conforms.

### 5.1 <http://schemas.microsoft.com/office/accessservices/2010/12/application> Schema

```
<xsd:schema xmlns="http://schemas.microsoft.com/office/accessservices/2010/12/application"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://schemas.microsoft.com/office/accessservices/2010/12/application"
xmlns:wblid="http://schemas.microsoft.com/office/word/2004/5/build" wblid:hash="true"
wblid:prefix="axl" wblid:cname="AXL" elementFormDefault="qualified">
  <xsd:simpleType name="ST_Decimal">
    <xsd:restriction base="xsd:decimal">
      <xsd:totalDigits value="28"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:simpleType name="ST_ObjectName">
    <xsd:restriction base="xsd:string">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="64"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:simpleType name="ST_UserInterfaceObjectEvent">
    <xsd:restriction base="xsd:string">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="64"/>
      <xsd:enumeration value="OnClick" wblid:cname="OnClick"/>
      <xsd:enumeration value="onclick" wblid:cname="onclick"/>
      <xsd:enumeration value="AfterUpdate" wblid:cname="AfterUpdate"/>
      <xsd:enumeration value="afterupdate" wblid:cname="afterupdate"/>
      <xsd:enumeration value="OnCurrent" wblid:cname="OnCurrent"/>
      <xsd:enumeration value="oncurrent" wblid:cname="oncurrent"/>
      <xsd:enumeration value="OnLoad" wblid:cname="OnLoad"/>
      <xsd:enumeration value="onload" wblid:cname="onload"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:simpleType name="ST_DataObjectEvent">
    <xsd:restriction base="xsd:string">
      <xsd:minLength value="1"/>
      <xsd:maxLength value="64"/>
      <xsd:enumeration value="AfterInsert" wblid:cname="AfterInsert"/>
      <xsd:enumeration value="AfterUpdate" wblid:cname="AfterUpdate"/>
      <xsd:enumeration value="AfterDelete" wblid:cname="AfterDelete"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:simpleType name="ST_ShortString">
    <xsd:restriction base="xsd:string">
      <xsd:maxLength value="255"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:simpleType name="ST_LongString">
    <xsd:restriction base="xsd:string">
      <xsd:maxLength value="1024"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:complexType name="CT_NamedExpression">
    <xsd:complexContent>
      <xsd:extension base="CT_ExpressionContents">
        <xsd:attribute name="Name" type="xsd:string" wblid:cname="Name" use="required"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="CT_Expression">
    <xsd:sequence>
```

```

        <xsd:element name="Expression" type="CT_ExpressionContents" wblid:cname="Expression"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT_ExpressionContents">
    <xsd:sequence>
        <xsd:element name="Original" type="xsd:string" minOccurs="0" wblid:cname="Original"/>
        <xsd:choice>
            <xsd:element name="FunctionCall" type="CT_FunctionCall" wblid:cname="FunctionCall"/>
            <xsd:element name="Identifier" type="CT_Identifier" wblid:cname="Identifier"/>
            <xsd:element name="DecimalLiteral" type="CT_DecimalLiteral"
wblid:cname="DecimalLiteral"/>
            <xsd:element name="IntegerLiteral" type="CT_IntegerLiteral"
wblid:cname="IntegerLiteral"/>
            <xsd:element name="NullLiteral" type="CT_NullLiteral" wblid:cname="NullLiteral"/>
            <xsd:element name="StringLiteral" type="CT_StringLiteral"
wblid:cname="StringLiteral"/>
            <xsd:element name="DateTimeLiteral" type="CT_DateTimeLiteral"
wblid:cname="DateTimeLiteral"/>
            <xsd:element name="DateLiteral" type="CT_DateLiteral" wblid:cname="DateLiteral"/>
            <xsd:element name="TimeLiteral" type="CT_TimeLiteral" wblid:cname="TimeLiteral"/>
            <xsd:element name="BitLiteral" type="CT_BitLiteral" wblid:cname="BitLiteral"/>
        </xsd:choice>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT_FunctionCall">
    <xsd:sequence minOccurs="0" maxOccurs="unbounded">
        <xsd:choice>
            <xsd:element name="FunctionCall" type="CT_IndexedFunctionCall"
wblid:cname="FunctionCall"/>
            <xsd:element name="Identifier" type="CT_IndexedIdentifier" wblid:cname="Identifier"/>
            <xsd:element name="DecimalLiteral" type="CT_IndexedDecimalLiteral"
wblid:cname="DecimalLiteral"/>
            <xsd:element name="IntegerLiteral" type="CT_IndexedIntegerLiteral"
wblid:cname="IntegerLiteral"/>
            <xsd:element name="NullLiteral" type="CT_IndexedNullLiteral"
wblid:cname="NullLiteral"/>
            <xsd:element name="StringLiteral" type="CT_IndexedStringLiteral"
wblid:cname="StringLiteral"/>
            <xsd:element name="TypeLiteral" type="CT_IndexedTypeLiteral"
wblid:cname="TypeLiteral"/>
            <xsd:element name="DatePartLiteral" type="CT_IndexedDatePartLiteral"
wblid:cname="DatePartLiteral"/>
            <xsd:element name="DateTimeLiteral" type="CT_IndexedDateTimeLiteral"
wblid:cname="DateTimeLiteral"/>
            <xsd:element name="DateLiteral" type="CT_IndexedDateLiteral"
wblid:cname="DateLiteral"/>
            <xsd:element name="TimeLiteral" type="CT_IndexedTimeLiteral"
wblid:cname="TimeLiteral"/>
            <xsd:element name="BitLiteral" type="CT_IndexedBitLiteral" wblid:cname="BitLiteral"/>
        </xsd:choice>
    </xsd:sequence>
    <xsd:attribute name="Name" type="xsd:string" use="required" wblid:cname="Name"/>
</xsd:complexType>
<xsd:complexType name="CT_Identifier">
    <xsd:attribute name="Name" type="xsd:string" use="required" wblid:cname="Name"/>
</xsd:complexType>
<xsd:complexType name="CT_DecimalLiteral">
    <xsd:attribute name="Value" type="ST Decimal" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_IntegerLiteral">
    <xsd:attribute name="Value" type="xsd:int" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_NullLiteral"/>
<xsd:complexType name="CT_StringLiteral">
    <xsd:attribute name="Value" type="xsd:string" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_DateTimeLiteral">
    <xsd:attribute name="Value" type="xsd:dateTime" use="required" wblid:cname="Value"/>
</xsd:complexType>

```

```

<xsd:complexType name="CT_TimeLiteral">
  <xsd:attribute name="Value" type="xsd:time" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_DateLiteral">
  <xsd:attribute name="Value" type="xsd:date" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_BitLiteral">
  <xsd:attribute name="Value" type="xsd:boolean" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_IndexedFunctionCall">
  <xsd:complexContent>
    <xsd:extension base="CT_FunctionCall">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedIdentifier">
  <xsd:complexContent>
    <xsd:extension base="CT_Identifier">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedDecimalLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_DecimalLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedIntegerLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_IntegerLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedNullLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_NullLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedStringLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_StringLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:simpleType name="ST_DatePartLiteral">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="YEAR" wblid:cname="YEAR"/>
    <xsd:enumeration value="QUARTER" wblid:cname="QUARTER"/>
    <xsd:enumeration value="MONTH" wblid:cname="MONTH"/>
    <xsd:enumeration value="DAYOFYEAR" wblid:cname="DAYOFYEAR"/>
    <xsd:enumeration value="DAY" wblid:cname="DAY"/>
    <xsd:enumeration value="WEEK" wblid:cname="WEEK"/>
    <xsd:enumeration value="WEEKDAY" wblid:cname="WEEKDAY"/>
    <xsd:enumeration value="HOUR" wblid:cname="HOUR"/>
    <xsd:enumeration value="MINUTE" wblid:cname="MINUTE"/>
    <xsd:enumeration value="SECOND" wblid:cname="SECOND"/>
    <xsd:enumeration value="MILLISECOND" wblid:cname="MILLISECOND"/>
    <xsd:enumeration value="ISO WEEK" wblid:cname="ISO WEEK"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="CT_IndexedDatePartLiteral">
  <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>

```

```

    <xsd:attribute name="Value" type="ST_DatePartLiteral" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:simpleType name="ST_TypeLiteral">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="FLOAT" wblid:cname="FLOAT"/>
    <xsd:enumeration value="INTEGER" wblid:cname="INTEGER"/>
    <xsd:enumeration value="CURRENCY" wblid:cname="CURRENCY"/>
    <xsd:enumeration value="YESNO" wblid:cname="YESNO"/>
    <xsd:enumeration value="TEXT" wblid:cname="TEXT"/>
    <xsd:enumeration value="SHORTTEXT" wblid:cname="SHORTTEXT"/>
    <xsd:enumeration value="LONGTEXT" wblid:cname="LONGTEXT"/>
    <xsd:enumeration value="DATEWITHTIME" wblid:cname="DATEWITHTIME"/>
    <xsd:enumeration value="DATE" wblid:cname="DATE"/>
    <xsd:enumeration value="TIME" wblid:cname="TIME"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="CT_IndexedTypeLiteral">
  <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
  <xsd:attribute name="Value" type="ST_TypeLiteral" use="required" wblid:cname="Value"/>
</xsd:complexType>
<xsd:complexType name="CT_IndexedDateTimeLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_DateTimeLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedTimeLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_TimeLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedDateLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_DateLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:complexType name="CT_IndexedBitLiteral">
  <xsd:complexContent>
    <xsd:extension base="CT_BitLiteral">
      <xsd:attribute name="Index" type="xsd:int" use="required" wblid:cname="Index"/>
    </xsd:extension>
  </xsd:complexContent>
</xsd:complexType>
<xsd:simpleType name="ST_JoinDirection">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Inner" wblid:cname="Inner"/>
    <xsd:enumeration value="Left Outer" wblid:cname="LeftOuter"/>
    <xsd:enumeration value="Right Outer" wblid:cname="RightOuter"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="ST_FieldType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Text" wblid:cname="Text"/>
    <xsd:enumeration value="Number" wblid:cname="Number"/>
    <xsd:enumeration value="Yes/No" wblid:cname="YesNo"/>
    <xsd:enumeration value="Currency" wblid:cname="Currency"/>
    <xsd:enumeration value="Date/Time" wblid:cname="DateTime"/>
    <xsd:enumeration value="LongText" wblid:cname="LongText"/>
    <xsd:enumeration value="Date" wblid:cname="Date"/>
    <xsd:enumeration value="Time" wblid:cname="Time"/>
    <xsd:enumeration value="Integer" wblid:cname="Integer"/>
    <xsd:enumeration value="Decimal" wblid:cname="Decimal"/>
  </xsd:restriction>
</xsd:simpleType>

```

```

<xsd:simpleType name="ST_SortDirection">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Ascending" wblid:cname="Ascending"/>
    <xsd:enumeration value="Descending" wblid:cname="Descending"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="ST_QuerySourceType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="Table" wblid:cname="Table"/>
    <xsd:enumeration value="Query" wblid:cname="Query"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="ST_TextType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="SingleLine" wblid:cname="SingleLine"/>
    <xsd:enumeration value="MultipleLines" wblid:cname="MultipleLines"/>
    <xsd:enumeration value="Hyperlink" wblid:cname="Hyperlink"/>
    <xsd:enumeration value="Email" wblid:cname="Email"/>
    <xsd:enumeration value="Person" wblid:cname="Person"/>
    <xsd:enumeration value="Phone" wblid:cname="Phone"/>
    <xsd:enumeration value="SingleChoiceField" wblid:cname="SingleChoiceField"/>
    <xsd:enumeration value="MultiChoiceField" wblid:cname="MultiChoiceField"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="ST_DecimalPlaces">
  <xsd:restriction base="xsd:nonNegativeInteger">
    <xsd:minInclusive value="0"/>
    <xsd:maxInclusive value="15"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:attribute name="AllowMultipleValues" wblid:cname="AllowMultipleValues"
type="xsd:boolean"/>
<xsd:attribute name="BoundColumn" wblid:cname="BoundColumn" type="ST_ObjectName"/>
<xsd:attribute name="Caption" type="ST_LongString" wblid:cname="Caption"/>
<xsd:attribute name="CurrencyLocale" wblid:cname="CurrencyLocale" type="xsd:string"/>
<xsd:attribute name="CurrencySymbol" wblid:cname="CurrencySymbol" type="xsd:string"/>
<xsd:attribute name="DecimalPlaces" type="ST_DecimalPlaces" wblid:cname="DecimalPlaces"/>
<xsd:attribute name="Description" wblid:cname="Description" type="xsd:string"/>
<xsd:attribute name="Udt" wblid:cname="Udt" type="xsd:string"/>
<xsd:attribute name="Direction" wblid:cname="Direction" type="ST_SortDirection"/>
<xsd:attribute name="DisplayColumn" wblid:cname="DisplayColumn" type="ST_ObjectName"/>
<xsd:attribute name="DisplayName" wblid:cname="DisplayName" type="ST_ObjectName"/>
<xsd:attribute name="DisplayOrder" wblid:cname="DisplayOrder" type="xsd:unsignedLong"/>
<xsd:attribute name="Format" wblid:cname="Format" type="ST_Format"/>
<xsd:attribute name="InternalName" wblid:cname="InternalName" type="ST_ObjectName"/>
<xsd:attribute name="Image" wblid:cname="Image" type="xsd:boolean"/>
<xsd:attribute name="LookupType" wblid:cname="LookupType" type="ST_LookupType"/>
<xsd:attribute name="ObjectId" wblid:cname="ObjectId" type="ST_ObjectName"/>
<xsd:attribute name="ReferencedTable" wblid:cname="ReferencedTable" type="ST_ObjectName"/>
<xsd:attribute name="SiteURL" wblid:cname="SiteURL" type="xsd:anyURI"/>
<xsd:attribute name="StoreGeneratedPattern" wblid:cname="StoreGeneratedPattern"
type="TStoreGeneratedPattern"/>
<xsd:attribute name="TextType" wblid:cname="TextType" type="ST_TextType"/>
<xsd:attribute name="UnderlyingType" wblid:cname="UnderlyingType" type="ST_FieldType"/>
<xsd:attribute name="Values" wblid:cname="Values" type="xsd:string"/>
<xsd:simpleType name="TStoreGeneratedPattern" wblid:cname="TStoreGeneratedPattern">
  <xsd:restriction base="xsd:token">
    <xsd:enumeration value="None" wblid:cname="None"/>
    <xsd:enumeration value="Identity" wblid:cname="Identity"/>
    <xsd:enumeration value="Computed" wblid:cname="Computed"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:simpleType name="ST_LookupType" wblid:cname="ST_LookupType">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="TableOrQuery" wblid:cname="TableOrQuery"/>
    <xsd:enumeration value="ValueList" wblid:cname="ValueList"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:complexType name="CT_Index">

```

```

    <xsd:sequence>
      <xsd:element name="PropertyRef" type="CT_PropertyRefIndex" wblid:cname="PropertyRef"
maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"
form="qualified"/>
    <xsd:attribute name="ObjectId" wblid:cname="ObjectId" type="ST_ObjectName"
form="qualified"/>
    <xsd:attribute name="Caption" type="ST_LongString" wblid:cname="Caption"
form="qualified"/>
  </xsd:complexType>
  <xsd:complexType name="CT_Unique">
    <xsd:complexContent>
      <xsd:extension base="CT_Index"/>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="CT_ConstraintWithExpression">
    <xsd:sequence>
      <xsd:element name="PropertyRef" wblid:cname="PropertyRef" type="CT_PropertyRef"
minOccurs="0"/>
      <xsd:element name="Expression" wblid:cname="Expression" type="CT_ExpressionContents"/>
    </xsd:sequence>
    <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"
form="qualified"/>
    <xsd:attribute name="ObjectId" wblid:cname="ObjectId" type="ST_ObjectName"
form="qualified"/>
  </xsd:complexType>
  <xsd:complexType name="CT_CheckConstraint">
    <xsd:complexContent>
      <xsd:extension base="CT_ConstraintWithExpression">
        <xsd:attribute name="CheckData" wblid:cname="CheckData" type="xsd:boolean"
use="optional" form="qualified"/>
        <xsd:attribute name="Message" wblid:cname="Message" type="ST_ShortString"
use="optional" form="qualified"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="CT_DefaultConstraint">
    <xsd:complexContent>
      <xsd:restriction base="CT_ConstraintWithExpression">
        <xsd:sequence>
          <xsd:element name="PropertyRef" wblid:cname="PropertyRef" type="CT_PropertyRef"/>
          <xsd:element name="Expression" wblid:cname="Expression"
type="CT_ExpressionContents"/>
        </xsd:sequence>
      </xsd:restriction>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="CT_PropertyRef">
    <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"/>
  </xsd:complexType>
  <xsd:complexType name="CT_PropertyRefIndex">
    <xsd:complexContent>
      <xsd:extension base="CT_PropertyRef">
        <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction"/>
      </xsd:extension>
    </xsd:complexContent>
  </xsd:complexType>
  <xsd:complexType name="CT_ExtendedAttribute" wblid:cname="CT_ExtendedAttribute">
    <xsd:attribute name="Name" wblid:cname="Name" type="ST_ObjectName" use="required"/>
    <xsd:attribute name="Value" wblid:cname="Value" type="ST_LongString" use="required"/>
  </xsd:complexType>
  <xsd:complexType name="CT_ExtendedAttributes" wblid:cname="CT_ExtendedAttributes">
    <xsd:sequence>
      <xsd:element name="ExtendedAttribute" wblid:cname="ExtendedAttribute"
type="CT_ExtendedAttribute" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>

```

```

<xsd:element name="ExtendedAttributes" wblid:cname="ExtendedAttributes"
type="CT_ExtendedAttributes"/>
<xsd:simpleType name="ST_Format" wblid:cname="ST_Format">
  <xsd:restriction base="xsd:string">
    <xsd:enumeration value="General Number" wblid:cname="GeneralNumber"/>
    <xsd:enumeration value="Currency" wblid:cname="Currency"/>
    <xsd:enumeration value="Fixed" wblid:cname="Fixed"/>
    <xsd:enumeration value="Standard" wblid:cname="Standard"/>
    <xsd:enumeration value="Percent" wblid:cname="Percent"/>
    <xsd:enumeration value="General Date" wblid:cname="GeneralDate"/>
    <xsd:enumeration value="Long Date" wblid:cname="LongDate"/>
    <xsd:enumeration value="Short Date" wblid:cname="ShortDate"/>
    <xsd:enumeration value="Long Time" wblid:cname="LongTime"/>
    <xsd:enumeration value="Short Time" wblid:cname="ShortTime"/>
  </xsd:restriction>
</xsd:simpleType>
<xsd:element name="Index" wblid:cname="Index" type="CT_Index"/>
<xsd:element name="Unique" wblid:cname="Unique" type="CT_Unique"/>
<xsd:element name="CheckConstraint" wblid:cname="CheckConstraint"
type="CT_CheckConstraint"/>
<xsd:element name="DefaultConstraint" wblid:cname="DefaultConstraint"
type="CT_DefaultConstraint"/>
<xsd:element name="PropertyRef" wblid:cname="PropertyRef" type="CT_PropertyRef"/>
<xsd:complexType name="CT_Order">
  <xsd:attribute name="Name" type="ST_LongString" use="required" wblid:cname="Name"/>
  <xsd:attribute name="Source" type="ST_ObjectName" use="required" wblid:cname="Source"/>
  <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_OrderExpression">
  <xsd:all>
    <xsd:element name="Expression" type="CT_ExpressionContents" minOccurs="1"
wblid:cname="Expression"/>
  </xsd:all>
  <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_Ordering">
  <xsd:choice maxOccurs="255">
    <xsd:element name="Order" wblid:cname="Order" type="CT_Order"/>
    <xsd:element name="OrderExpression" wblid:cname="OrderExpression"
type="CT_OrderExpression"/>
  </xsd:choice>
</xsd:complexType>
<xsd:complexType name="CT_AdHocOrder">
  <xsd:attribute name="Name" type="ST_LongString" use="required" wblid:cname="Name"/>
  <xsd:attribute name="Direction" type="ST_SortDirection" default="Ascending"
wblid:cname="Direction" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_AdHocOrdering">
  <xsd:choice maxOccurs="255">
    <xsd:element name="Order" wblid:cname="Order" type="CT_AdHocOrder"/>
    <xsd:element name="OrderExpression" wblid:cname="OrderExpression"
type="CT_OrderExpression"/>
  </xsd:choice>
</xsd:complexType>
<xsd:complexType name="CT_Reference">
  <xsd:all>
    <xsd:element name="ReferenceParameters" minOccurs="0" type="CT_Parameters"
wblid:cname="ReferenceParameters"/>
  </xsd:all>
  <xsd:attribute name="Source" type="ST_ObjectName" use="required" wblid:cname="Source"/>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
  <xsd:attribute name="Type" type="ST_QuerySourceType" default="Table" wblid:cname="Type"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_References">
  <xsd:sequence>

```



```

        <xsd:element name="Reference" maxOccurs="unbounded" wblid:cname="Reference"
type="CT_Reference"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT_Result">
    <xsd:all>
        <xsd:element name="Expression" type="CT_ExpressionContents" minOccurs="0"
wblid:cname="Expression"/>
    </xsd:all>
    <xsd:attribute name="Source" type="ST_ObjectName" wblid:cname="Source" use="optional"/>
    <xsd:attribute name="Name" type="ST_LongString" wblid:cname="Name" use="optional"/>
    <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
    <xsd:attribute name="All" type="xsd:boolean" default="false" wblid:cname="All"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_Results">
    <xsd:sequence>
        <xsd:element name="Property" maxOccurs="255" wblid:cname="Property" type="CT_Result"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT_Join">
    <xsd:attribute name="Left" type="ST_ObjectName" use="required" wblid:cname="Left"/>
    <xsd:attribute name="Right" type="ST_ObjectName" use="required" wblid:cname="Right"/>
    <xsd:attribute name="LeftProperty" type="ST_LongString" use="required"
wblid:cname="LeftProperty"/>
    <xsd:attribute name="RightProperty" type="ST_LongString" use="required"
wblid:cname="RightProperty"/>
    <xsd:attribute name="Type" type="ST_JoinDirection" default="Inner" wblid:cname="Type"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT Joins">
    <xsd:sequence>
        <xsd:element name="Join" wblid:cname="Join" maxOccurs="unbounded" type="CT_Join"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT Group">
    <xsd:attribute name="Source" type="ST_ObjectName" wblid:cname="Source" use="required"/>
    <xsd:attribute name="Name" type="ST_LongString" wblid:cname="Name" use="required"/>
</xsd:complexType>
<xsd:complexType name="CT GroupExpression">
    <xsd:all>
        <xsd:element name="Expression" type="CT ExpressionContents" minOccurs="1"
wblid:cname="Expression"/>
    </xsd:all>
</xsd:complexType>
<xsd:complexType name="CT Groups">
    <xsd:choice maxOccurs="unbounded">
        <xsd:element name="Group" wblid:cname="Group" type="CT Group"/>
        <xsd:element name="GroupExpression" wblid:cname="GroupExpression"
type="CT_GroupExpression"/>
    </xsd:choice>
</xsd:complexType>
<xsd:complexType name="CT_Parameter">
    <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
    <xsd:attribute name="Type" type="ST_FieldType" use="required" wblid:cname="Type"/>
</xsd:complexType>
<xsd:complexType name="CT Parameters">
    <xsd:sequence>
        <xsd:element name="Parameter" maxOccurs="unbounded" wblid:cname="Parameter"
type="CT_Parameter"/>
    </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT_ParameterDefinition">
    <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
    <xsd:attribute name="Description" type="ST_LongString" wblid:cname="Description"
use="optional"/>
    <xsd:attribute name="Type" type="ST_FieldType" use="required" wblid:cname="Type"/>
</xsd:complexType>
<xsd:complexType name="CT_ParameterDefinitions">

```

```

    <xsd:sequence>
      <xsd:element name="Parameter" maxOccurs="unbounded" wblid:cname="Parameter"
type="CT_ParameterDefinition"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_ParameterValue">
    <xsd:sequence>
      <xsd:element name="Expression" type="CT_ExpressionContents" wblid:cname="Expression"/>
    </xsd:sequence>
    <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
  </xsd:complexType>
  <xsd:complexType name="CT_OutputParameter">
    <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
    <xsd:attribute name="LocalVarName" type="ST_ObjectName" use="required"
wblid:cname="LocalVarName"/>
  </xsd:complexType>
  <xsd:complexType name="CT_ParameterValues">
    <xsd:sequence>
      <xsd:element name="Parameter" minOccurs="0" maxOccurs="unbounded"
wblid:cname="Parameter" type="CT_ParameterValue"/>
      <xsd:element name="OutputParameter" minOccurs="0" maxOccurs="unbounded"
wblid:cname="OutputParameter" type="CT_OutputParameter"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_TopRows">
    <xsd:attribute name="Rows" type="xsd:positiveInteger" use="required" wblid:cname="Rows"/>
  </xsd:complexType>
  <xsd:simpleType name="ST_Percent">
    <xsd:restriction base="xsd:float">
      <xsd:minExclusive value="0"/>
      <xsd:maxInclusive value="100"/>
    </xsd:restriction>
  </xsd:simpleType>
  <xsd:complexType name="CT_TopPercent">
    <xsd:attribute name="Percent" use="required" wblid:cname="Percent" type="ST_Percent"/>
  </xsd:complexType>
  <xsd:complexType name="CT_Query">
    <xsd:sequence>
      <xsd:choice minOccurs="0">
        <xsd:element name="TopRows" type="CT_TopRows" wblid:cname="TopRows"/>
        <xsd:element name="TopPercent" type="CT_TopPercent" wblid:cname="TopPercent"/>
      </xsd:choice>
      <xsd:element name="Parameters" minOccurs="0" type="CT_Parameters"
wblid:cname="Parameters"/>
      <xsd:element name="References" type="CT_References" wblid:cname="References"/>
      <xsd:element name="Results" type="CT_Results" wblid:cname="Results"/>
      <xsd:element name="Joins" minOccurs="0" type="CT_Joins" wblid:cname="Joins"/>
      <xsd:element name="Restriction" type="CT_Expression" minOccurs="0"
wblid:cname="Restriction"/>
      <xsd:element name="Groups" minOccurs="0" type="CT_Groups" wblid:cname="Groups"/>
      <xsd:element name="GroupRestriction" minOccurs="0" type="CT_Expression"
wblid:cname="GroupRestriction"/>
      <xsd:element name="Ordering" minOccurs="0" type="CT_Ordering" wblid:cname="Ordering"/>
    </xsd:sequence>
    <xsd:attribute name="Name" type="ST_ObjectName" wblid:cname="Name" use="optional"/>
    <xsd:attribute name="Distinct" type="xsd:boolean" wblid:cname="Distinct" use="optional"/>
  </xsd:complexType>
  <xsd:complexType name="CT_Argument">
    <xsd:simpleContent>
      <xsd:extension base="ST_LongString">
        <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
      </xsd:extension>
    </xsd:simpleContent>
  </xsd:complexType>
  <xsd:complexType name="CT_ExpressionArgument">
    <xsd:sequence>
      <xsd:element name="Expression" type="CT_ExpressionContents" wblid:cname="Expression"/>
    </xsd:sequence>
    <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>

```

```

</xsd:complexType>
<xsd:complexType name="CT_Action">
  <xsd:sequence>
    <xsd:choice minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="Argument" wblid:cname="Argument" type="CT_Argument"/>
      <xsd:element name="ExpressionArgument" wblid:cname="ExpressionArgument"
type="CT_ExpressionArgument"/>
    </xsd:choice>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Name" type="ST_ObjectName" use="required" wblid:cname="Name"/>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_ForEachRecordData">
  <xsd:sequence>
    <xsd:element name="Reference" type="ST_ObjectName" wblid:cname="Reference"/>
    <xsd:element name="WhereCondition" minOccurs="0" type="CT_Expression"
wblid:cname="WhereCondition"/>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_ForEachRecord">
  <xsd:sequence>
    <xsd:element name="Data" wblid:cname="Data" type="CT_ForEachRecordData"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_LookupRecordData">
  <xsd:sequence>
    <xsd:element name="Reference" type="ST_ObjectName" wblid:cname="Reference"/>
    <xsd:element name="WhereCondition" minOccurs="0" type="CT_Expression"
wblid:cname="WhereCondition"/>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_LookupRecord">
  <xsd:sequence>
    <xsd:element name="Data" wblid:cname="Data" type="CT_LookupRecordData"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_CreateRecordData">
  <xsd:sequence>
    <xsd:choice>
      <xsd:element name="Reference" type="ST_ObjectName" wblid:cname="Reference"/>
    </xsd:choice>
    <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterValues"
wblid:cname="Parameters"/>
  </xsd:sequence>
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_CreateRecord">
  <xsd:sequence>
    <xsd:element name="Data" wblid:cname="Data" type="CT_CreateRecordData"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>

```

```

<xsd:complexType name="CT_EditRecordData">
  <xsd:attribute name="Alias" type="ST_ObjectName" wblid:cname="Alias" use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_EditRecord">
  <xsd:sequence>
    <xsd:element name="Data" type="CT_EditRecordData" wblid:cname="Data"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_UserInterfaceIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_UserInterfaceElseIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_UserInterfaceElse">
  <xsd:sequence>
    <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_DataIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_DataElseIf">
  <xsd:sequence>
    <xsd:element name="Condition" type="CT_Expression" wblid:cname="Condition"/>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_DataElse">
  <xsd:sequence>
    <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
  </xsd:sequence>
  <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
</xsd:complexType>
<xsd:complexType name="CT_UserInterfaceConditionalBlock">
  <xsd:sequence>
    <xsd:element name="If" wblid:cname="If" type="CT_UserInterfaceIf"/>
    <xsd:element name="ElseIf" minOccurs="0" maxOccurs="unbounded" wblid:cname="ElseIf"
type="CT_UserInterfaceElseIf"/>
    <xsd:element name="Else" minOccurs="0" wblid:cname="Else" type="CT_UserInterfaceElse"/>
  </xsd:sequence>
</xsd:complexType>
<xsd:complexType name="CT_DataConditionalBlock">

```

```

    <xsd:sequence>
      <xsd:element name="If" wblid:cname="If" type="CT_DataIf"/>
      <xsd:element name="ElseIf" minOccurs="0" maxOccurs="unbounded" wblid:cname="ElseIf"
type="CT_DataElseIf"/>
      <xsd:element name="Else" minOccurs="0" wblid:cname="Else" type="CT_DataElse"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_UserInterfaceMacroStatements">
    <xsd:choice minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="Action" type="CT_Action" wblid:cname="Action"/>
      <xsd:element name="Comment" type="ST_LongString" wblid:cname="Comment"/>
      <xsd:element name="ConditionalBlock" type="CT_UserInterfaceConditionalBlock"
wblid:cname="ConditionalBlock"/>
      <xsd:element name="StatementGroup" type="CT_UserInterfaceMacroStatementGroup"
wblid:cname="StatementGroup"/>
    </xsd:choice>
  </xsd:complexType>
  <xsd:complexType name="CT_DataMacroStatements">
    <xsd:choice minOccurs="0" maxOccurs="unbounded">
      <xsd:element name="Action" type="CT_Action" wblid:cname="Action"/>
      <xsd:element name="Comment" type="ST_LongString" wblid:cname="Comment"/>
      <xsd:element name="ForEachRecord" type="CT_ForEachRecord" wblid:cname="ForEachRecord"/>
      <xsd:element name="LookupRecord" type="CT_LookupRecord" wblid:cname="LookupRecord"/>
      <xsd:element name="CreateRecord" type="CT_CreateRecord" wblid:cname="CreateRecord"/>
      <xsd:element name="EditRecord" type="CT_EditRecord" wblid:cname="EditRecord"/>
      <xsd:element name="ConditionalBlock" type="CT_DataConditionalBlock"
wblid:cname="ConditionalBlock"/>
      <xsd:element name="StatementGroup" type="CT_DataMacroStatementGroup"
wblid:cname="StatementGroup"/>
    </xsd:choice>
  </xsd:complexType>
  <xsd:complexType name="CT_UserInterfaceMacroStatementGroup">
    <xsd:sequence>
      <xsd:element name="Statements" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
    </xsd:sequence>
    <xsd:attribute name="Description" type="ST_LongString" wblid:cname="Description"
use="optional"/>
    <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
  </xsd:complexType>
  <xsd:complexType name="CT_DataMacroStatementGroup">
    <xsd:sequence>
      <xsd:element name="Statements" type="CT_DataMacroStatements" wblid:cname="Statements"/>
    </xsd:sequence>
    <xsd:attribute name="Description" type="ST_LongString" wblid:cname="Description"
use="optional"/>
    <xsd:attribute name="Collapsed" type="xsd:boolean" wblid:cname="Collapsed"
use="optional"/>
  </xsd:complexType>
  <xsd:element name="Query" type="CT_Query" wblid:cname="Query"/>
  <xsd:element name="Ordering" type="CT_AdHocOrdering" wblid:cname="Ordering"/>
  <xsd:complexType name="CT_Expressions">
    <xsd:sequence>
      <xsd:element name="Expression" minOccurs="0" maxOccurs="unbounded"
type="CT_NamedExpression" wblid:cname="Expression"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:element name="Expression" type="CT_ExpressionContents" wblid:cname="Expression"/>
  <xsd:complexType name="CT_UserInterfaceMacros">
    <xsd:choice maxOccurs="unbounded">
      <xsd:element name="UserInterfaceMacro" minOccurs="0" maxOccurs="unbounded"
type="CT_UserInterfaceMacro" wblid:cname="UserInterfaceMacro"/>
    </xsd:choice>
  </xsd:complexType>
  <xsd:complexType name="CT_DataMacros">
    <xsd:choice maxOccurs="unbounded">
      <xsd:element name="DataMacro" minOccurs="0" maxOccurs="unbounded" type="CT_DataMacro"
wblid:cname="DataMacro"/>
    </xsd:choice>
  </xsd:complexType>

```

```

    </xsd:choice>
  </xsd:complexType>
  <xsd:complexType name="CT_EventDataMacro">
    <xsd:sequence>
      <xsd:element name="DataMacro" minOccurs="1" maxOccurs="1" type="CT_DataMacro"
wblid:cname="DataMacro"/>
    </xsd:sequence>
    <xsd:attribute name="Version" type="xsd:string" wblid:cname="Version" use="optional"/>
  </xsd:complexType>
  <xsd:element name="UserInterfaceMacros" wblid:cname="UserInterfaceMacros"
type="CT_UserInterfaceMacros"/>
  <xsd:element name="DataMacros" wblid:cname="DataMacros" type="CT_DataMacros"/>
  <xsd:element name="EventDataMacro" wblid:cname="EventDataMacro" type="CT_EventDataMacro"/>
  <xsd:element name="UserInterfaceMacro" wblid:cname="UserInterfaceMacro"
type="CT_UserInterfaceMacro"/>
  <xsd:element name="DataMacro" wblid:cname="DataMacro" type="CT_DataMacro"/>
  <xsd:complexType name="CT_UserInterfaceMacro">
    <xsd:sequence>
      <xsd:element name="Statements" minOccurs="0" type="CT_UserInterfaceMacroStatements"
wblid:cname="Statements"/>
    </xsd:sequence>
    <xsd:attribute name="For" type="ST_ObjectName" wblid:cname="For" use="optional"/>
    <xsd:attribute name="Event" type="ST_UserInterfaceObjectEvent" wblid:cname="Event"
use="optional"/>
  </xsd:complexType>
  <xsd:complexType name="CT_DataMacro">
    <xsd:sequence>
      <xsd:element name="Parameters" minOccurs="0" type="CT_ParameterDefinitions"
wblid:cname="Parameters"/>
      <xsd:element name="Statements" minOccurs="0" type="CT_DataMacroStatements"
wblid:cname="Statements"/>
    </xsd:sequence>
    <xsd:attribute name="Event" type="ST_DataObjectEvent" wblid:cname="Event" use="optional"/>
    <xsd:attribute name="Version" type="xsd:string" wblid:cname="Version" use="optional"/>
  </xsd:complexType>
  <xsd:complexType name="CT_FormDef">
    <xsd:sequence>
      <xsd:element name="RecordSource" type="xsd:string" wblid:cname="RecordSource"
minOccurs="0"/>
      <xsd:element name="Html" wblid:cname="Html" type="xsd:string"/>
      <xsd:element name="UserInterfaceMacros" wblid:cname="UserInterfaceMacros"
wblid:codeName="UserInterfaceMacros" type="CT_UserInterfaceMacros" minOccurs="0"/>
      <xsd:element name="Expressions" wblid:cname="Expressions" wblid:codeName="Expressions"
type="CT_Expressions" minOccurs="0"/>
      <xsd:element name="Query" wblid:cname="Query" wblid:codeName="Query" type="CT_Query"
minOccurs="0"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:element name="FormDef" wblid:cname="FormDef" type="CT_FormDef"/>
</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 Access 2013
- Microsoft SharePoint Server 2013
- Microsoft Access 2016
- Microsoft SharePoint Server 2016

Exceptions, if any, are noted below. If a service pack or Quick Fix Engineering (QFE) number appears with the product version, behavior changed in that service pack or QFE. The new behavior also applies to subsequent service packs of the product unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms SHOULD or SHOULD NOT implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term MAY implies that the product does not follow the prescription.

[<1> Section 2.1.4](#): Microsoft Access Services preserves these values in SharePoint Server 2013.

## 7 Change Tracking

This section identifies changes that were made to this document since the last release. 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](mailto:dochelp@microsoft.com).

Section	Tracking number (if applicable) and description	Major change (Y or N)	Change type
<a href="#">6</a> Appendix B: Product Behavior	Updated list of supported products.	Y	Content updated due to protocol revision.

## 8 Index

### A

[After insert example](#) 108  
[Applicability](#) 12  
[Attributes](#) 23

### C

[Change tracking](#) 128  
[Common data types and fields](#) 14  
Complex type  
  [CT\\_UserInterfaceMcroStatements](#) 50  
[Complex types](#) 29  
  [CT\\_Action](#) 40  
  [CT\\_AdHocOrder](#) 30  
  [CT\\_AdHocOrdering](#) 31  
  [CT\\_Argument](#) ([section 2.2.3.19](#) 39, [section 2.2.3.78](#) 77)  
  [CT\\_CreateRecord](#) 44  
  [CT\\_CreateRecordData](#) 43  
  [CT\\_DataConditionalBlock](#) 49  
  [CT\\_DataElse](#) 48  
  [CT\\_DataElseIf](#) 48  
  [CT\\_DataIf](#) 47  
  [CT\\_DataMacro](#) 54  
  [CT\\_DataMacros](#) 53  
  [CT\\_DataMacroStatementGroup](#) 52  
  [CT\\_DataMacroStatements](#) 51  
  [CT\\_EditRecord](#) 45  
  [CT\\_EditRecordData](#) 44  
  [CT\\_ForEachRecord](#) 41  
  [CT\\_ForEachRecordData](#) 41  
  [CT\\_Join](#) 34  
  [CT\\_Joins](#) 35  
  [CT\\_LookupRecord](#) 43  
  [CT\\_LookupRecordData](#) 42  
  [CT\\_Order](#) ([section 2.2.3.2](#) 29, [section 2.2.3.72](#) 74, [section 2.2.3.73](#) 75, [section 2.2.3.76](#) 76)  
  [CT\\_Ordering](#) ([section 2.2.3.3](#) 30, [section 2.2.3.5](#) 31, [section 2.2.3.74](#) 75)  
  [CT\\_Parameter](#) ([section 2.2.3.12](#) 35, [section 2.2.3.72](#) 74, [section 2.2.3.73](#) 75)  
  [CT\\_ParameterDefinitions](#) ([section 2.2.3.14](#) 36, [section 2.2.3.15](#) 37)  
  [CT\\_Parameters](#) ([section 2.2.3.13](#) 36, [section 2.2.3.79](#) 78)  
  [CT\\_ParameterValue](#) ([section 2.2.3.16](#) 37, [section 2.2.3.75](#) 76)  
  [CT\\_ParameterValues](#) 38  
  [CT\\_Query](#) 38  
  [CT\\_Reference](#) 31  
  [CT\\_References](#) 32  
  [CT\\_Result](#) 32  
  [CT\\_Results](#) 34  
  [CT\\_UserInterfaceConditionalBlock](#) 49  
  [CT\\_UserInterfaceElse](#) 47  
  [CT\\_UserInterfaceElseIf](#) 46  
  [CT\\_UserInterfaceIf](#) 45  
  [CT\\_UserInterfaceMacro](#) 54  
  [CT\\_UserInterfaceMacros](#) 53  
  [CT\\_UserInterfaceMacroStatementGroup](#) 52

### Conceptual overview

[ignored value](#) 18  
  [macros](#) 16  
  [queries](#) 17  
  [tables](#) 14  
[CT\\_Action complex type](#) 40  
[CT\\_AdHocOrder complex type](#) 30  
[CT\\_AdHocOrdering complex type](#) 31  
[CT\\_Argument complex type](#) ([section 2.2.3.19](#) 39, [section 2.2.3.78](#) 77)  
[CT\\_CreateRecord complex types](#) 44  
[CT\\_CreateRecordData complex type](#) 43  
[CT\\_DataConditionalBlock complex type](#) 49  
[CT\\_DataElse complex type](#) 48  
[CT\\_DataElseIf complex type](#) 48  
[CT\\_DataIf complex type](#) 47  
[CT\\_DataMacro complex type](#) 54  
[CT\\_DataMacros complex types](#) 53  
[CT\\_DataMacroStatementGroup complex type](#) 52  
[CT\\_DataMacroStatements complex type](#) 51  
[CT\\_EditRecord complex type](#) 45  
[CT\\_EditRecordData complex type](#) 44  
[CT\\_ForEachRecord complex type](#) 41  
[CT\\_ForEachRecordData complex type](#) 41  
[CT\\_Join complex type](#) 34  
[CT\\_Joins complex type](#) 35  
[CT\\_LookupRecord complex type](#) 43  
[CT\\_LookupRecordData complex type](#) 42  
[CT\\_Order complex type](#) ([section 2.2.3.2](#) 29, [section 2.2.3.72](#) 74, [section 2.2.3.73](#) 75, [section 2.2.3.76](#) 76)  
[CT\\_Ordering complex type](#) ([section 2.2.3.3](#) 30, [section 2.2.3.5](#) 31, [section 2.2.3.74](#) 75)  
[CT\\_Parameter complex type](#) ([section 2.2.3.12](#) 35, [section 2.2.3.72](#) 74, [section 2.2.3.73](#) 75)  
[CT\\_ParameterDefinitions complex type](#) ([section 2.2.3.14](#) 36, [section 2.2.3.15](#) 37)  
[CT\\_Parameters complex type](#) ([section 2.2.3.13](#) 36, [section 2.2.3.79](#) 78)  
[CT\\_ParameterValue complex type](#) ([section 2.2.3.16](#) 37, [section 2.2.3.75](#) 76)  
[CT\\_ParameterValues complex type](#) 38  
[CT\\_Query complex type](#) 38  
[CT\\_Reference complex type](#) 31  
[CT\\_References complex type](#) 32  
[CT\\_Result complex type](#) 32  
[CT\\_Results complex type](#) 34  
[CT\\_UserInterfaceConditionalBlock complex type](#) 49  
[CT\\_UserInterfaceElse complex type](#) 47  
[CT\\_UserInterfaceElseIf complex type](#) 46  
[CT\\_UserInterfaceIf complex type](#) 45  
[CT\\_UserInterfaceMacro complex types](#) 54  
[CT\\_UserInterfaceMacros complex type](#) 53  
[CT\\_UserInterfaceMacroStatementGroup complex type](#) 52  
[CT\\_UserInterfaceMcroStatements complex type](#) 50

### D

Data macros  
  [overview](#) 11

[Data Macros example](#) 107  
[Data types and fields - common](#) 14  
[DataMacros element](#) 19  
 Details  
   [attributes](#) 23  
   [common data types and fields](#) 14  
   [complex types](#) 29  
   [CT Action complex type](#) 40  
   [CT AdHocOrder complex type](#) 30  
   [CT AdHocOrdering complex type](#) 31  
   [CT\\_Argument complex type \(section 2.2.3.19](#) 39,  
     [section 2.2.3.78](#) 77)  
   [CT CreateRecord complex types](#) 44  
   [CT CreateRecordData complex type](#) 43  
   [CT DataConditionalBlock complex type](#) 49  
   [CT DataElse complex type](#) 48  
   [CT DataElseIf complex type](#) 48  
   [CT DataIf complex type](#) 47  
   [CT DataMacro complex type](#) 54  
   [CT DataMacros complex types](#) 53  
   [CT DataMacroStatementGroup complex type](#) 52  
   [CT DataMacroStatements complex type](#) 51  
   [CT EditRecord complex type](#) 45  
   [CT EditRecordData complex type](#) 44  
   [CT ForEachRecord complex type](#) 41  
   [CT ForEachRecordData complex type](#) 41  
   [CT Join complex type](#) 34  
   [CT Joins complex type](#) 35  
   [CT LookupRecord complex type](#) 43  
   [CT LookupRecordData complex type](#) 42  
   [CT\\_Order complex type \(section 2.2.3.2](#) 29,  
     [section 2.2.3.72](#) 74, [section 2.2.3.73](#) 75, [section](#)  
     [2.2.3.76](#) 76)  
   [CT\\_Ordering complex type \(section 2.2.3.3](#) 30,  
     [section 2.2.3.5](#) 31, [section 2.2.3.74](#) 75)  
   [CT\\_Parameter complex type \(section 2.2.3.12](#) 35,  
     [section 2.2.3.72](#) 74, [section 2.2.3.73](#) 75)  
   [CT\\_ParameterDefinitions complex type \(section](#)  
     [2.2.3.14](#) 36, [section 2.2.3.15](#) 37)  
   [CT\\_Parameters complex type \(section 2.2.3.13](#) 36,  
     [section 2.2.3.79](#) 78)  
   [CT\\_ParameterValue complex type \(section](#)  
     [2.2.3.16](#) 37, [section 2.2.3.75](#) 76)  
   [CT\\_ParameterValues complex type](#) 38  
   [CT Query complex type](#) 38  
   [CT Reference complex type](#) 31  
   [CT References complex type](#) 32  
   [CT Result complex type](#) 32  
   [CT Results complex type](#) 34  
   [CT UserInterfaceConditionalBlock complex type](#) 49  
   [CT UserInterfaceElse complex type](#) 47  
   [CT UserInterfaceElseIf complex type](#) 46  
   [CT UserInterfaceIf complex type](#) 45  
   [CT UserInterfaceMacro complex types](#) 54  
   [CT UserInterfaceMacros complex type](#) 53  
   [CT UserInterfaceMacroStatementGroup complex](#)  
     [type](#) 52  
   [CT UserInterfaceMacroStatements complex type](#) 50  
   [DataMacros element](#) 19  
   [elements](#) 19  
   [macros](#) 94  
   [Ordering element](#) 19  
   [query element](#) 19  
   [simple types](#) 83  
   [ST\\_FieldType simple type](#) 85

[ST\\_JoinDirection simple type \(section 2.2.4.5](#) 85,  
   [section 2.2.4.15](#) 92, [section 2.2.4.16](#) 93)  
[ST\\_LongString simple type](#) 84  
[ST\\_ObjectName simple type](#) 83  
[ST\\_ShortString simple type](#) 84  
[ST\\_SortDirection simple type \(section 2.2.4.7](#) 86,  
   [section 2.2.4.18](#) 94)  
[ST\\_UserInterfaceObjectEvent simple type](#) 83  
[UserInterfaceMacro elements](#) 20  
[UserInterfaceMacros elements](#) 19

## E

[Elements](#) 19  
   [DataMacros](#) 19  
   [Ordering](#) 19  
   [query](#) 19  
   [UserInterfaceMacro](#) 20  
   [UserInterfaceMacros](#) 19  
[Examples](#) 103  
   [after insert](#) 108  
   [Data Macros](#) 107  
     [after insert](#) 108  
     [named macro](#) 109  
     [validate delete](#) 107  
   [Forms](#) 105  
     [multiple reference query with join](#) 111  
     [named macro](#) 109  
   [Queries](#) 110  
     [multiple reference query with join](#) 111  
     [single reference query](#) 110  
     [single reference query](#) 110  
   [standalone](#) 106  
   [Tables](#) 103  
   [UI Macros](#) 105  
     [standalone](#) 106  
     [validation and exceptions](#) 106  
   [validate delete](#) 107  
   [validation and exceptions](#) 106

## F

[Fields - security index](#) 113  
[Fields - vendor-extensible](#) 13  
[Forms example](#) 105  
[Full XML schema](#) 114

## G

[Glossary](#) 8

## I

[Ignored value conceptual overview](#) 18  
[Implementer - security considerations](#) 113  
[Index of security fields](#) 113  
[Informative references](#) 10  
[Introduction](#) 8

## L

[Localization](#) 13

## M

[Macros](#) 94  
[Multiple reference query with join example](#) 111

## N

[Named macro example](#) 109  
[Normative references](#) 9

## O

[Ordering element](#) 19  
Overview  
  [data macros](#) 11  
  [queries](#) 12  
  [tables](#) 10  
  [UI macros](#) 11  
[Overview \(synopsis\)](#) 10

## P

[Product behavior](#) 127

## Q

Queries  
  [overview](#) 12  
[Queries conceptual overview](#) 17  
[Queries example](#) 110  
[Query element](#) 19

## R

[References](#) 9  
  [informative](#) 10  
  [normative](#) 9  
[Relationship to protocols and other structures](#) 12

## S

Security  
  [field index](#) 113  
  [implementer considerations](#) 113  
[Simple types](#) 83  
  [ST\\_FieldType](#) 85  
  ST\_JoinDirection ([section 2.2.4.5](#) 85, [section 2.2.4.15](#) 92, [section 2.2.4.16](#) 93)  
  [ST\\_LongString](#) 84  
  [ST\\_ObjectName](#) 83  
  [ST\\_ShortString](#) 84  
  ST\_SortDirection ([section 2.2.4.7](#) 86, [section 2.2.4.18](#) 94)  
  [ST\\_UserInterfaceObjectEvent](#) 83  
[Single reference query example](#) 110  
[ST\\_FieldType simple type](#) 85  
ST\_JoinDirection simple type ([section 2.2.4.5](#) 85, [section 2.2.4.15](#) 92, [section 2.2.4.16](#) 93)  
[ST\\_LongString simple type](#) 84  
[ST\\_ObjectName simple type](#) 83  
[ST\\_ShortString simple type](#) 84  
ST\_SortDirection simple type ([section 2.2.4.7](#) 86, [section 2.2.4.18](#) 94)  
[ST\\_UserInterfaceObjectEvent simple type](#) 83  
[Standalone example](#) 106

Structures  
  [arguments](#) 100  
  [attributes](#) 23  
  [complex types](#) 29  
  [data macros](#) 17  
  [elements](#) 19  
  [ignored value](#) 18  
  macros ([section 2.1.2](#) 16, [section 2.2.5](#) 94)  
  [overview](#) 14  
  [queries](#) 17  
  [query](#) 19  
  [simple types](#) 83  
  [tables](#) 14  
  [user interface macros](#) 17  
  [variables](#) 17

## T

Tables  
  [overview](#) 10  
Tables conceptual overview ([section 2.1.1](#) 14, [section 2.1.2](#) 16)  
[Tables example](#) 103  
[Tracking changes](#) 128

## U

UI macros  
  [overview](#) 11  
[UI Macros example](#) 105  
[UserInterfaceMacro elements](#) 20  
[UserInterfaceMacros elements](#) 19

## V

[Validate delete example](#) 107  
[Validation and exceptions example](#) 106  
[Vendor-extensible fields](#) 13  
[Versioning](#) 13

## X

[XML schema](#) 114