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## Revision Summary

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1 Introduction

This document specifies the Office Macro-Enabled File Format Version 2. This file format specifies the structures of macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats that are either not present in or modified from non-macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats described in [ISO/IEC29500-1:2016]. The macro-enabled file formats consist of the non-macro-enabled file formats described in [ISO/IEC29500-1:2016] and the XML structures, XML, and non-XML parts described in this document.

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:

- **AutoFilter**: A mechanism that can be used to filter tabular data based on user-defined criteria such as values, strings, and formatting.

- **conditional formatting**: A mechanism that changes the appearance of a user interface element based on the evaluation of a rule or expression.

- **data consolidation**: The process of combining tabular data from various worksheets into a single list.

- **document**: An object in a content database such as a file, folder, list, or site. Each object is identified by a URI.

- **embedded object**: An object that is created by using one application and is hosted in a document that was created by using another application. Embedding an object, rather than inserting or pasting it, ensures that the object retains its original format. Users can double-click an embedded object and edit it with the toolbars and menus from the application that was used to create it. See also Object Linking and Embedding (OLE).

- **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].

- **locale**: A collection of rules and data that are specific to a language and a geographical area. A locale can include information about sorting rules, date and time formatting, numeric and monetary conventions, and character classification.

- **macro**: A set of instructions that are recorded or written, and then typically saved to a file. When a macro is run, all of the instructions are performed automatically.

- **macro sheet**: A single, logical container that is used to store and run Microsoft Excel 4.0 for Windows macro formulas.

- **page break**: A divider that breaks a worksheet into separate pages for printing. Page breaks are inserted automatically based on the paper size, margin settings, scaling options, and the positions of any page breaks that are inserted manually.

- **page margin**: The white space at the top, bottom, and sides of a document when a document is printed.

- **phonetic information**: A series of characters that appear above text in a cell and provide information that helps users pronounce the text.

- **presentation**: A collection of slides that are intended to be viewed by an audience.
**protection**: A mechanism that helps restrict users from making unwanted changes to the data or structure of a workbook.

**range**: An addressable region that is in a workbook. A range typically consists of zero or more cells and represents a single, contiguous rectangle of cells on a single sheet.

**sheet**: A worksheet. The term sheet frequently refers to a worksheet because worksheets are the most common type of sheet.

**sheet view**: A collection of display settings, such as which cells are shown, and the zoom level for a sheet window.

**sort condition**: A condition that determines how to sort cells in a range.

**table**: A list that is defined in a workbook.

**Vector Markup Language (VML)**: A system of marking up or tagging two-dimensional vector graphics for publication on the World Wide Web. VML graphics are scalable and editable, and typically require less disk space and less time to download.

**Visual Basic for Applications (VBA)**: A macro-based programming language that derives from Microsoft Visual Basic and can be used to customize and extend an application. Unlike Visual Basic, Microsoft Visual Basic for Applications (VBA) code and macros can be run only from within a host application that supports VBA.

**workbook**: A container for a collection of sheets.

**worksheet**: A single logical container for a set of tabular data and other objects in a workbook.

**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. We will assist you in finding the relevant information.


1.2.2 Informative References


1.3 Structure Overview

This file format specifies structures of macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats that are either not present in or modified from non-macro-enabled WordprocessingML, SpreadsheetML, and PresentationML file formats described in [ISO/IEC29500-1:2016]. Document, Workbook, and Presentation data are each contained in a compressed file (.zip) package conforming to the Open Packaging Conventions as described in [ISO/IEC29500-2:2012]. Individual files stored in a ZIP package, called parts ([ISO/IEC29500-1:2016]), contain information about the content and structure of a document, workbook, or presentation. Some parts store information using XML and other parts store information by using binary data.

1.4 Relationship to Protocols and Other Structures

The structures specified in section 2 are dependent on the structures and concepts defined in the following references:


1.5 Applicability Statement

This document specifies a persistence format for structures either not present in or modified from the structures described in [ISO/IEC29500-1:2016] for WordprocessingML, SpreadsheetML, and PresentationML documents. The structures specified in this document are not applicable as a stand-alone file format. Each structure specified in this document is integrated with [ISO/IEC29500-1:2016] WordprocessingML, SpreadsheetML, or PresentationML documents in a particular way, as specified in the section for that structure.
1.6 Versioning and Localization
None.

1.7 Vendor-Extensible Fields
None.
2 Structures

All global elements, global attributes, complex types, and simple types not defined in [ISO/IEC 29500-1:2016] and not defined in the following target namespaces are extensions that use conventions specified in [ISO/IEC 29500-3:2015]:

- http://schemas.openxmlformats.org/presentationml/2006/main

2.1 Macro-enabled WordprocessingML Structures

2.1.1 Part Enumeration

This section specifies the parts ([ISO/IEC 29500-1:2016]) of the macro-enabled WordprocessingML file format that are different from the parts of the non-macro-enabled WordprocessingML file format specified in [ISO/IEC 29500-1:2016] section 11.3. These parts and their relationships are summarized in the following table.

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<tr>
<td>VBA Supplemental Data (section 2.1.1.3)</td>
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2.1.1.1 Main Document

Content Types:

- application/vnd.ms-word.document.macroEnabled.main+xml
- application/vnd.ms-word.template.macroEnabledTemplate.main+xml

Root Namespace: http://schemas.openxmlformats.org/wordprocessingml/2006/main

Source Relationship:

The part is modified from the Main Document specified in [ISO/IEC 29500-1:2016], section 11.3.10. A Main Document part is permitted to have an implicit relationship to the VBA Project part.

2.1.1.2 VBA Project

Content Type: application/vnd.ms-office.vbaProject

Root Namespace: Not applicable

Source Relationship: http://schemas.microsoft.com/office/2006/relationships/vbaProject
This part is specified in [MS-OVBA].

A package MUST contain at most one VBA Project part, which MUST be the target of an implicit relationship from the Main Document part (section 2.1.1).

A VBA Project part MUST have an implicit relationship to the VBA Supplemental Data part (section 2.1.1.3).

A VBA Project part MUST NOT have implicit or explicit relationships to any other part specified by this document or any part specified in [ISO/IEC29500-1:2016].

2.1.1.3 VBA Supplemental Data

Content Type: application/vnd.ms-word.vbaData+xml

Root Namespace: http://schemas.microsoft.com/office/word/2006/wordml

Source Relationship: http://schemas.microsoft.com/office/2006/relationships/wordVbaData

An instance of this part type specifies Visual Basic for Applications (VBA) supplemental Data.

A VBA Supplemental Data part MUST be the target of an implicit relationship from the VBA Project part (section 2.1.1.2).

A VBA Supplemental Data part MUST NOT have implicit or explicit relationships to any other part specified by this document or any part specified in [ISO/IEC29500-1:2016].

The root element for a part of this content type MUST be vbaSuppData (section 2.1.3.1).

2.1.2 Extensions

None.

2.1.3 Global Elements

2.1.3.1 vbaSuppData

Target namespace: http://schemas.microsoft.com/office/word/2006/wordml

A CT_VbaSuppData element (section 2.1.5.4) that specifies supplemental Visual Basic for Applications (VBA) data.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this element.

```xml
<xsd:element name="vbaSuppData" type="CT_VbaSuppData"/>
```

2.1.4 Global Attributes

None.

2.1.5 Complex Types

2.1.5.1 CT_DocEvents

Target namespace: http://schemas.microsoft.com/office/word/2006/wordml
A complex type that specifies a container of document events that are active for this document.

**Child Elements:**

- **eventDocNew**: An element that specifies that the **New** event is active.
- **eventDocOpen**: An element that specifies that the **Open** event is active.
- **eventDocClose**: An element that specifies that the **Close** event is active.
- **eventDocSync**: An element that specifies that the **Sync** event is active.
- **eventDocXmlAfterInsert**: An element that specifies that the **XmlAfterInsert** event is active.
- **eventDocXmlBeforeDelete**: An element that specifies that the **XmlBeforeDelete** event is active.
- **eventDocContentControlAfterInsert**: An element that specifies that the **ContentControlAfterInsert** event is active.
- **eventDocContentControlBeforeDelete**: An element that specifies that the **ContentControlBeforeDelete** event is active.
- **eventDocContentControlOnExit**: An element that specifies that the **ContentControlOnExit** event is active.
- **eventDocContentControlOnEnter**: An element that specifies that the **ContentControlOnEnter** event is active.
- **eventDocStoreUpdate**: An element that specifies that the **StoreUpdate** event is active.
- **eventDocContentControlContentUpdate**: An element that specifies that the **ContentControlContentUpdate** event is active.
- **eventDocBuildingBlockAfterInsert**: An element that specifies that the **BuildingBlockAfterInsert** event is active.

The following W3C XML Schema ([XMLSCHEMA1/2](#) section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_DocEvents">
  <xsd:sequence>
    <xsd:element name="eventDocNew" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocOpen" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocClose" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocSync" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocXmlAfterInsert" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocXmlBeforeDelete" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlAfterInsert" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlBeforeDelete" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlOnExit" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlOnEnter" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocStoreUpdate" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocContentControlContentUpdate" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="eventDocBuildingBlockAfterInsert" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```

### 2.1.5.2 CT_Mcd

**Target namespace**: http://schemas.microsoft.com/office/word/2006/wordml
A complex type that specifies a macro.

Attributes:

**macroName**: An **ST_String** attribute ([ISO/IEC29500-1:2016] section 22.9.2.13) that MUST equal the **name** attribute with every character set to uppercase.

**name**: An **ST_String** attribute ([ISO/IEC29500-1:2016] section 22.9.2.13) that specifies the name of the **macro**. This attribute MUST NOT exceed 255 characters.

**menuHelp**: An **ST_String** attribute ([ISO/IEC29500-1:2016] section 22.9.2.13) that MUST be ignored.

**bEncrypt**: An **ST_UcharHexNumber** attribute ([ISO/IEC29500-1:2016] section 17.18.98) that MUST be 0.

**cmg**: An **ST_UcharHexNumber** attribute ([ISO/IEC29500-1:2016] section 17.18.98) that MUST be 56.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_Mcd">
  <xsd:attribute name="macroName" type="w:ST_String" use="optional"/>
  <xsd:attribute name="name" type="w:ST_String" use="optional"/>
  <xsd:attribute name="menuHelp" type="w:ST_String" use="optional"/>
  <xsd:attribute name="bEncrypt" type="w:ST_UcharHexNumber"/>
  <xsd:attribute name="cmg" type="w:ST_UcharHexNumber"/>
</xsd:complexType>
```

### 2.1.5.3 CT_Mcds

**Target namespace**: http://schemas.microsoft.com/office/word/2006/wordml

**Referenced by**: [CT_VbaSuppData](#)

A complex type that specifies a collection of **macros**.

**Child Elements**:

**mcd**: A **CT_Mcd** element (section 2.1.5.2) that specifies a macro.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_Mcds">
  <xsd:sequence>
    <xsd:element name="mcd" type="CT_Mcd" minOccurs="0" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

### 2.1.5.4 CT_VbaSuppData

**Target namespace**: http://schemas.microsoft.com/office/word/2006/wordml

**Referenced by**: [vbaSuppData](#)
A complex type that specifies document events and **macro** information for the VBA project.

*Child Elements:*

**docEvents:** A **CT_DocEvents** element (section 2.1.5.1) that specifies a container of document events that are active for this document.

**mcds:** A **CT_Mcds** element (section 2.1.5.3) that specifies a collection of macros stored in the VBA project.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_VbaSuppData">
  <xsd:sequence>
    <xsd:element name="docEvents" type="CT_DocEvents" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="mcds" type="CT_Mcds" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```

### 2.1.6 Simple Types

None.

### 2.2 Macro-enabled SpreadsheetML structures

#### 2.2.1 Part Enumeration

This section specifies the parts ([ISO/IEC29500-1:2016]) of the macro-enabled SpreadsheetML file format that are different from the parts of the non-macro-enabled SpreadsheetML file format specified in [ISO/IEC29500-1:2016] section 12.3. These parts and their relationships are summarized in the following table.

<table>
<thead>
<tr>
<th>Part</th>
<th>Relationship target</th>
</tr>
</thead>
<tbody>
<tr>
<td>International Macro Sheet</td>
<td>Workbook (section 2.2.1.4)</td>
</tr>
<tr>
<td>Macro Sheet</td>
<td>Workbook (section 2.2.1.4)</td>
</tr>
<tr>
<td>VBA Project</td>
<td>Workbook (section 2.2.1.4)</td>
</tr>
</tbody>
</table>

#### 2.2.1.1 International Macro Sheet

*Content Type:* application/vnd.ms-excel.intlmacrosheet+xml


An instance of this part type specifies the same information as a **Macro Sheet** part type (section 2.2.1.2). When this part type is present, the associated **macro sheet** will display and operate with the US English **locale**, regardless of what the product locale, user locale, or system locale is. This will maximize compatibility when running under various locales.
2.2.1.2 Macro Sheet

Content Type: application/vnd.ms-excel.macroelement+xml

Root Namespace: http://schemas.microsoft.com/office/excel/2006/main


An instance of this part type specifies a macro sheet. References to the macro sheet part in this document include international macro sheets (section 2.2.1.1) as well.

A macro sheet part MUST be the target of an explicit relationship from the Workbook part (section 2.2.1.4).

The root element for a part of this content type MUST be macrosheet (section 2.2.3.1).

A macro sheet part is permitted to have implicit relationships to the following parts specified in [ISO/IEC29500-1:2016]:

- Comments
- A macro sheet part is permitted to have implicit relationships to the following parts specified in [MS-XLSB]:
  - Macro Sheet Binary Index
  - Sort Map
- A macro sheet part is permitted to have explicit relationships to the following parts specified in [ISO/IEC29500-1:2016]:
  - Custom Property
  - Drawings
  - OLE Object
  - OLE Package
  - Images
  - Printer Settings
  - VML Drawing

A macro sheet part MUST NOT have implicit or explicit relationships to any other part specified in [ISO/IEC29500-1:2016].

A formula ([ISO/IEC29500-1:2016] section 18.17) in a macro sheet is specified by Formulas (section 2.2.7), which is an extension of the definition in [MS-XLSX] section 2.2.2.

2.2.1.3 VBA Project

Content Type: application/vnd.ms-office.vbaProject

Root Namespace: Not applicable

Source Relationship: http://schemas.microsoft.com/office/2006/relationships/vbaProject

This part is specified in [MS-OVBA].
A package MUST contain at most one VBA Project part, which MUST be the target of an implicit relationship from the **Workbook** part (section 2.2.1.4).

A VBA Project part MUST NOT have implicit or explicit relationships to any other part specified by this document or any other part specified in [ISO/IEC29500-1:2016].

### 2.2.1.4 Workbook

**Content Types:**

- application/vnd.ms-excel.sheet.macroEnabled.main+xml
- application/vnd.ms-excel.template.macroEnabled.main+xml

**Root Namespace:** http://schemas.openxmlformats.org/spreadsheetml/2006/main

**Source Relationship:**


This part is modified from the part specified in [ISO/IEC29500-1:2016] Part1, section 12.3.23.

A Workbook part is permitted to have an implicit relationship to the **VBA Project** (section 2.2.1.3), **Macro Sheet** (section 2.2.1.2), and **International Macro Sheet** (section 2.2.1.1) parts.

### 2.2.2 Excel Extensions

Extensions are specified by using conventions provided by [ISO/IEC29500-3:2015].

#### 2.2.2.1 Extensions by Part


##### 2.2.2.1.1 extLst


<table>
<thead>
<tr>
<th>Ext uri</th>
<th>Child element</th>
</tr>
</thead>
<tbody>
<tr>
<td>{8193D73E-4604-4355-AFF4-8A2333D13BE4}</td>
<td>definedNames (section 2.2.3.2)</td>
</tr>
</tbody>
</table>

For more information about how extension lists are used, see [ISO/IEC29500-1:2016] section 18.2.10.

### 2.2.3 Global Elements

#### 2.2.3.1 macrosheet

**Target namespace:** http://schemas.microsoft.com/office/excel/2006/main

A **CT_Worksheet** element (section 2.2.5.1) that specifies a **macro sheet**.
The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this element.

```xml
<xsd:element name="macrosheet" type="CT_Worksheet"/>
```

### 2.2.3.2 definedNames

**Target namespace:** http://schemas.microsoft.com/office/excel/2008/2/main

A **CT_DefinedNames** element (section 2.2.5.2) that specifies additional properties for **macros**.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this element.

```xml
<xsd:element name="definedNames" type="CT_DefinedNames"/>
```

### 2.2.4 Global Attributes

None.

### 2.2.5 Complex Types

#### 2.2.5.1 CT_Worksheet

**Target namespace:** http://schemas.microsoft.com/office/excel/2006/main

**Referenced by:** macrosheet

A complex type that specifies properties for a **macro sheet**.

**Child Elements:**

- **sheetPr**: A **CT_SheetPr** element ([ISO/IEC29500-1:2016] section A.2) that specifies sheet-level properties.
- **dimension**: A **CT_SheetDimension** element ([ISO/IEC29500-1:2016] section A.2) that specifies the used **range** of the **worksheet**.
- **cols**: A **CT_Cols** element ([ISO/IEC29500-1:2016] section A.2) that specifies information about whole columns of the worksheet.
- **sheetCalcPr**: This element MUST be ignored in a macro sheet.
- **protectedRanges**: This element MUST be ignored in a macro sheet.
scenarios: This element MUST be ignored in a macro sheet.


sortState: A CT_SortState element ([ISO/IEC29500-1:2016] section A.2) that specifies the different sort conditions that apply to a range.


mergeCells: This element MUST be ignored in a macro sheet.


dataValidations: This element MUST be ignored in a macro sheet.

 hyperlinks: This element MUST be ignored in a macro sheet.


customProperties: A CT_CustomProperties element ([ISO/IEC29500-1:2016] section A.2) that specifies references to binary parts containing arbitrary user-defined data.

cellWatches: This element MUST be ignored in a macro sheet.

ignoredErrors: This element MUST be ignored in a macro sheet.

smartTags: This element MUST be ignored in a macro sheet.


picture: A CT_SheetBackgroundPicture element ([ISO/IEC29500-1:2016] section A.2) that specifies a background image of a sheet.

controls: This element MUST be ignored in a macro sheet.

webPublishItems: A CT_WebPublishItems element ([ISO/IEC29500-1:2016] section A.2) that specifies individual objects that have been published to HTML.

tableParts: A CT_TableParts element ([ISO/IEC29500-1:2016] section A.2) that specifies references to parts specifying every table on the sheet.

extLst: A CT_ExtensionList element ([ISO/IEC29500-1:2016] section A.2) that specifies future extensions to this format.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_Worksheet">
  <xsd:sequence>
    <xsd:element name="sheetPr" type="x:CT_SheetPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="dimension" type="x:CT_SheetDimension" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sheetViews" type="x:CT_SheetViews" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sheetFormatPr" type="x:CT_SheetFormatPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="cols" type="x:CT_Cols" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="sheetData" type="x:CT_SheetData" minOccurs="1" maxOccurs="1"/>
    <xsd:element name="sheetCalcPr" type="x:CT_SheetCalcPr" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sheetProtection" type="x:CT_SheetProtection" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="protectedRanges" type="x:CT_ProtectedRanges" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="scenarios" type="x:CT_Scenarios" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="autoFilter" type="x:CT_AutoFilter" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="sortState" type="x:CT_SortState" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="dataConsolidate" type="x:CT_DataConsolidate" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="customSheetViews" type="x:CT_CustomSheetViews" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="mergeCells" type="x:CT_MergeCells" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="mergeCellGroups" type="x:CT_MergeCellGroups" minOccurs="0" maxOccurs="unbounded"/>
    <xsd:element name="customProperties" type="x:CT_CustomProperties" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="cellWatches" type="x:CT_CellWatches" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="ignoredErrors" type="x:CT_IgnoredErrors" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="picture" type="x:CT_SheetBackgroundPicture" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="oleObjects" type="x:CT_OleObjects" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="controls" type="x:CT_Controls" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="webPublishItems" type="x:CT_WebPublishItems" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="tableParts" type="x:CT_TableParts" minOccurs="0" maxOccurs="1"/>
    <xsd:element name="extLst" type="x:CT_ExtensionList" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
</xsd:complexType>
```
2.2.5.2 CT_DefinedNames

Target namespace: http://schemas.microsoft.com/office/excel/2008/2/main

Referenced by: definedNames

A complex type that specifies a group of additional properties for macros.

Child Elements:

definedName: A CT_DefinedName element (section 2.2.5.3) that specifies additional properties for a particular macro.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_DefinedNames">
  <xsd:sequence>
    <xsd:element name="definedName" type="CT_DefinedName" minOccurs="1" maxOccurs="unbounded"/>
  </xsd:sequence>
</xsd:complexType>
```

2.2.5.3 CT_DefinedName

Target namespace: http://schemas.microsoft.com/office/excel/2008/2/main

Referenced by: CT_DefinedNames

A complex type that specifies additional properties for a macro named name.

Child Elements:

argumentDescriptions: A CT_DefinedNameArgumentDescriptions element (section 2.2.5.4) that specifies a group of descriptions for the macro arguments if the macro has arguments.

Attributes:

name: An ST_Xstring attribute ([ISO/IEC29500-1:2016] section 22.9.2.19) that specifies the name of a macro. The name attribute value MUST be unique for each CT_DefinedName element inside the CT_DefinedNames element (section 2.2.5.2). At least one of the following conditions MUST be true: There exists a CT_DefinedName ([ISO/IEC29500-1:2016] section A.2) element with a name attribute equal to this value and either the vbProcedure attribute or the xlm attribute is equal to 1, or there exists a Visual Basic for Applications (VBA) macro having a name equal to this value.

The string MUST adhere to the name grammar as specified in [MS-XLSX] section 2.2.2.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_DefinedName">
  <xsd:sequence>
    <xsd:element name="argumentDescriptions" type="CT_DefinedNameArgumentDescriptions" minOccurs="0" maxOccurs="1"/>
  </xsd:sequence>
  <xsd:attribute name="name" type="x:ST_Xstring" use="required"/>
</xsd:complexType>
```
2.2.5.4 CT_DefinedNameArgumentDescriptions

Target namespace: http://schemas.microsoft.com/office/excel/2008/2/main

Referenced by: CT_DefinedName

A complex type that specifies a group of argument descriptions for a particular macro.

Child Elements:

argumentDescription: A CT_DefinedNameArgumentDescription element (section 2.2.5.5) that specifies an argument description for a particular macro. Each index attribute of these child elements MUST be unique for all CT_DefinedNameArgumentDescription elements (section 2.2.5.5) within this CT_DefinedNameArgumentDescriptions element.

Attributes:

count: An unsignedInt attribute ([XMLSCHEMA2/2] section 3.3.22) that specifies the number of CT_DefinedNameArgumentDescription child elements (section 2.2.5.5) of this element and specifies the number of argument descriptions of the associated macro. MUST be greater than or equal to 1 and MUST be less than or equal to 60.

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_DefinedNameArgumentDescriptions">
    <xsd:sequence>
        <xsd:element name="argumentDescription" type="CT_DefinedNameArgumentDescription" minOccurs="1" maxOccurs="unbounded"/>
    </xsd:sequence>
    <xsd:attribute name="count" type="xsd:unsignedInt" use="optional"/>
</xsd:complexType>
```

2.2.5.5 CT_DefinedNameArgumentDescription

Target namespace: http://schemas.microsoft.com/office/excel/2008/2/main

Referenced by: CT_DefinedNameArgumentDescriptions

A complex type that specifies an argument description for a particular argument of a macro. The length of the ST_Xstring ([ISO/IEC29500-1:2016] section 22.9.2.19) MUST be less than or equal to 255.

Attributes:

index: An unsignedInt attribute ([XMLSCHEMA2/2] section 3.3.22) that specifies the zero-based index referring to the argument at position index of the associated macro. MUST be less than the count attribute value in the parent CT_DefinedNameArgumentDescription element (section 2.2.5.5).

The following W3C XML Schema ([XMLSCHEMA1/2] section 2.1) fragment defines the contents of this complex type.

```xml
<xsd:complexType name="CT_DefinedNameArgumentDescription">
    <xsd:simpleContent>
        <xsd:extension base="x:ST_Xstring">
            <xsd:attribute name="index" type="xsd:unsignedInt" use="required"/>
        </xsd:extension>
    </xsd:simpleContent>
</xsd:complexType>
```
2.2.6 Simple Types
None.

2.2.7 Formulas

function-call ÷/ (macro-function-call / command-function-call)

2.3 Macro-Enabled PresentationML Structures

2.3.1 Part Enumeration

This section specifies the parts ([ISO/IEC29500-1:2016]) of the macro-enabled PresentationML file format that are different from the parts of the non-macro-enabled PresentationML file format specified in [ISO/IEC29500-1:2016] section 13.3. These parts and their relationships are summarized in the following table.

<table>
<thead>
<tr>
<th>Part</th>
<th>Relationship target</th>
</tr>
</thead>
<tbody>
<tr>
<td>Presentation (section 2.3.1.1)</td>
<td>PresentationML Package ([ISO/IEC29500-1:2016] section 13.2)</td>
</tr>
<tr>
<td>VBA Project (section 2.3.1.2)</td>
<td>Presentation (section 2.3.1.1)</td>
</tr>
</tbody>
</table>

2.3.1.1 Presentation

Content Types:
- application/vnd.ms-powerpoint.presentation.macroEnabled.main+xml
- application/vnd.ms-powerpoint.slideshow.macroEnabled.main+xml
- application/vnd.ms-powerpoint.template.macroEnabled.main+xml

Root Namespace: http://schemas.openxmlformats.org/presentationml/2006/main


This part is modified from the presentation part specified in [ISO/IEC29500-1:2016] Part 1, section 13.3.6.presentation part is permitted to have an implicit relationship to the VBA Project part.

2.3.1.2 VBA Project

Content Type: application/vnd.ms-office.vbaProject

Root Namespace: Not applicable

Source Relationship: http://schemas.microsoft.com/office/2006/relationships/vbaProject

This part is specified in [MS-OVBA].
A package MUST contain at most one VBA Project part, which MUST be the target of an implicit relationship from the presentation part (section 2.3.1.1).

A VBA Project part MUST NOT have implicit or explicit relationships to any other part specified by this document or any part specified in [ISO/IEC29500-1:2016].

2.3.2 Extensions
None.

2.3.3 Global Elements
None.

2.3.4 Global Attributes
None.

2.3.5 Complex Types

2.3.5.1 CT_SlideMasterIdListEntry

Target namespace: http://schemas.openxmlformats.org/presentationml/2006/main

This element specifies a slide master that is available within the corresponding presentation. A slide master is a slide that is specifically designed to be a template for all related child layout slides.

This complex type is modified from the sldMasterId specified in [ISO/IEC29500-1:2016], section 19.2.1.36.

The id attribute of this part MUST be present in the macro-enabled PresentationML format.

2.3.6 Simple Types
None.
3 Structure Examples

3.1 VBA Supplemental Data Part

This example shows a usage of a Word VBA Supplemental Data part (section 2.1.1.3). Consider the following XML, showing the complete contents of the VBA Supplemental Data part (section 2.1.1.3) of a word-processing document.

```xml
<wne:vbaSuppData
 xmlns:o="urn:schemas-microsoft-com:office:office"
 xmlns:m="http://schemas.openxmlformats.org/officeDocument/2006/math"
 xmlns:x="urn:schemas-microsoft-com:vml"
 xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main"
 xmlns:wne="http://schemas.microsoft.com/office/word/2006/wordml">
 <wne:docEvents>
  <wne:eventDocOpen/>
  <wne:eventDocXmlAfterInsert/>
 </wne:docEvents>
 <wne:mcds>
  <wne:mcd wne:macroName="PROJECT.NEWMACROS.MACRO1" wne:name="Project.NewMacros.Macro1" wne:bEncrypt="00" wne:cmg="56"/>
 </wne:mcds>
</wne:vbaSuppData>
```

The `docEvents` child of the `vbaSuppData` element (section 2.1.3.1) specifies that both the Open event and the XMLAfterInsert event are active for this document. The `mcds` element of the `vbaSuppData` element (section 2.1.3.1) contains an `mcd` element that specifies macro information for the "Project.NewMacros.Macro1" macro.

3.2 Macro Sheet Part

This example shows a usage of an Excel macro sheet part (section 2.2.1.2). Consider the following XML, showing the complete contents of a macro sheet part (section 2.2.1.2) of a workbook.

```xml
<xm:macrosheet
 xmlns="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
 <dimension ref="A1"/>
 <sheetViews>
  <sheetView showFormulas="1" tabSelected="1" workbookViewId="0">
   <selection activeCell="A2" sqref="A2"/>
  </sheetView>
 </sheetViews>
</xm:macrosheet>
```

The `macrosheet` element (section 2.2.3.1) specifies the macro sheet. A formula following the grammar specified in section 2.2.7 is specified by the `f` element ([ISO/IEC29500-1:2016] section 18.17).
4 Security Considerations

4.1 Security Considerations for Implementers
None.

4.2 Index of Security Fields
None.
5 Appendix A: Full XML Schemas

For ease of implementation, this section provides the full W3C XML Schemas for the new elements, attributes, complex types, and simple types specified in the preceding sections. Any schema references to namespaces included in [ISO/IEC29500-1:2016] refer specifically to the transitional schemas as specified in [ISO/IEC29500-4:2016].

5.1 http://schemas.microsoft.com/office/word/2006/wordml Schema

```xml
<xsd:schema elementFormDefault="qualified"
xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns:w="http://schemas.openxmlformats.org/wordprocessingml/2006/main"
targetNamespace="http://schemas.microsoft.com/office/word/2006/wordml">
schemaLocation="word12.xsd"/>
  <xsd:import id="rel" namespace="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
schemaLocation="orel.xsd"/>
  <xsd:element name="vbaSuppData" type="CT_VbaSuppData"/>
  <xsd:complexType name="CT_DocEvents">
    <xsd:sequence>
      <xsd:element name="eventDocNew" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocOpen" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocClose" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocSync" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocXmlAfterInsert" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocXmlBeforeDelete" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlAfterInsert" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlBeforeDelete" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlOnExit" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlOnEnter" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlContentUpdate" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocBuildingBlockAfterInsert" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_Mcd">
    <xsd:attribute name="macroName" type="w:ST_String" use="optional"/>
    <xsd:attribute name="name" type="w:ST_String" use="optional"/>
    <xsd:attribute name="menuHelp" type="w:ST_String" use="optional"/>
    <xsd:attribute name="bEncrypt" type="w:ST_UcharHexNumber"/>
    <xsd:attribute name="cmg" type="w:ST_UcharHexNumber"/>
  </xsd:complexType>
  <xsd:complexType name="CT_Mcdfs">
    <xsd:sequence>
      <xsd:element name="mcd" type="CT_Mcd" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_VbaSuppData">
    <xsd:sequence>
      <xsd:element name="docEvents" type="CT_DocEvents" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="mcdfs" type="CT_Mcdfs" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```

5.2 http://schemas.microsoft.com/office/excel/2006/main Schema

```xml
<xsd:schema elementFormDefault="qualified" xmlns:xsd="http://www.w3.org/2001/XMLSchema"
xmlns="http://schemas.microsoft.com/office/excel/2006/main"
xmlns:x="http://schemas.openxmlformats.org/spreadsheetml/2006/main"
  <xsd:element name="vbaSuppData" type="CT_VbaSuppData"/>
  <xsd:complexType name="CT_DocEvents">
    <xsd:sequence>
      <xsd:element name="eventDocNew" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocOpen" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocClose" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocSync" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocXmlAfterInsert" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocXmlBeforeDelete" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlAfterInsert" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlBeforeDelete" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlOnExit" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlOnEnter" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocContentControlContentUpdate" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="eventDocBuildingBlockAfterInsert" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_Mcd">
    <xsd:attribute name="macroName" type="w:ST_String" use="optional"/>
    <xsd:attribute name="name" type="w:ST_String" use="optional"/>
    <xsd:attribute name="menuHelp" type="w:ST_String" use="optional"/>
    <xsd:attribute name="bEncrypt" type="w:ST_UcharHexNumber"/>
    <xsd:attribute name="cmg" type="w:ST_UcharHexNumber"/>
  </xsd:complexType>
  <xsd:complexType name="CT_Mcdfs">
    <xsd:sequence>
      <xsd:element name="mcd" type="CT_Mcd" minOccurs="0" maxOccurs="unbounded"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="CT_VbaSuppData">
    <xsd:sequence>
      <xsd:element name="docEvents" type="CT_DocEvents" minOccurs="0" maxOccurs="1"/>
      <xsd:element name="mcdfs" type="CT_Mcdfs" minOccurs="0" maxOccurs="1"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```
targetNamespace="http://schemas.microsoft.com/office/excel/2006/main"
schemaLocation="xlmacrosheet.xsd" />
<xsd:complexType name="CT_Worksheet">
<xsd:sequence>
<xsd:element name="sheetPr" type="x:CT_SheetPr" minOccurs="0" maxOccurs="1"/>
<xsd:element name="dimension" type="x:CT_SheetDimension" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sheetViews" type="x:CT_SheetViews" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sheetFormatPr" type="x:CT_SheetFormatPr" minOccurs="0" maxOccurs="1"/>
<xsd:element name="cols" type="x:CT_Cols" minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="sheetData" type="x:CT_SheetData" minOccurs="1" maxOccurs="1"/>
<xsd:element name="sheetProtection" type="x:CT_SheetProtection" minOccurs="0" maxOccurs="1"/>
<xsd:element name="protectedRanges" type="x:CT_ProtectedRanges" minOccurs="0" maxOccurs="1"/>
<xsd:element name="scenarios" type="x:CT_Scenarios" minOccurs="0" maxOccurs="1"/>
<xsd:element name="autoFilter" type="x:CT_AutoFilter" minOccurs="0" maxOccurs="1"/>
<xsd:element name="sortState" type="x:CT_SortState" minOccurs="0" maxOccurs="1"/>
<xsd:element name="dataConsolidate" type="x:CT_DataConsolidate" minOccurs="0" maxOccurs="1"/>
<xsd:element name="customSheetViews" type="x:CT_CustomSheetViews" minOccurs="0" maxOccurs="1"/>
<xsd:element name="mergeCells" type="x:CT_MergeCells" minOccurs="0" maxOccurs="1"/>
<xsd:element name="conditionalFormatting" type="x:CT_ConditionalFormatting" minOccurs="0" maxOccurs="unbounded"/>
<xsd:element name="dataValidations" type="x:CT_DataValidations" minOccurs="0" maxOccurs="1"/>
<xsd:element name="hyperlinks" type="x:CT_Hyperlinks" minOccurs="0" maxOccurs="1"/>
<xsd:element name="printOptions" type="x:CT_PrintOptions" minOccurs="0" maxOccurs="1"/>
<xsd:element name="pageMargins" type="x:CT_PageMargins" minOccurs="0" maxOccurs="1"/>
<xsd:element name="headerFooter" type="x:CT_HeaderFooter" minOccurs="0" maxOccurs="1"/>
<xsd:element name="rowBreaks" type="x:CT_PageBreak" minOccurs="0" maxOccurs="1"/>
<xsd:element name="colBreaks" type="x:CT_PageBreak" minOccurs="0" maxOccurs="1"/>
<xsd:element name="customProperties" type="x:CT_CustomProperties" minOccurs="0" maxOccurs="1"/>
<xsd:element name="cellWatches" type="x:CT_CellWatches" minOccurs="0" maxOccurs="1"/>
<xsd:element name="ignoredErrors" type="x:CT_IgnoredErrors" minOccurs="0" maxOccurs="1"/>
<xsd:element name="smartTags" type="x:CT_SmartTags" minOccurs="0" maxOccurs="1"/>
<xsd:element name="drawing" type="x:CT_Drawing" minOccurs="0" maxOccurs="1"/>
<xsd:element name="picture" type="x:CT_SheetBackgroundPicture" minOccurs="0" maxOccurs="1"/>
<xsd:element name="oleObjects" type="x:CT_OleObjects" minOccurs="0" maxOccurs="1"/>
<xsd:element name="controls" type="x:CT_Controls" minOccurs="0" maxOccurs="1"/>
<xsd:element name="webPublishItems" type="x:CT_WebPublishItems" minOccurs="0" maxOccurs="1"/>
<xsd:element name="tableParts" type="x:CT_TableParts" minOccurs="0" maxOccurs="1"/>
</xsd:sequence>
</xsd:complexType>
</xsd:schema>

5.3 http://schemas.microsoft.com/office/excel/2008/2/main Schema

<xsd:schema elementFormDefault="qualified"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://schemas.openxmlformats.org/officeDocument/2006/relationships"
xmlns:x="http://schemas.microsoft.com/office/excel/2008/2/main"
xmlns:x:s="http://schemas.microsoft.com/office/excel/2008/2/main">
</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 updates to those products.

- Microsoft Office 2010 suites
- Microsoft Office 2013
- Microsoft Visual Basic for Applications 6.0 (VBA 6.0)
- Microsoft Visual Basic for Applications 7.0 (VBA 7.0)
- Microsoft Office 2016
- Microsoft Office 2019
- Microsoft Office 2021

Exceptions, if any, are noted in this section. If an update version, service pack or Knowledge Base (KB) number appears with a product name, the behavior changed in that update. The new behavior also applies to subsequent updates unless otherwise specified. If a product edition appears with the product version, behavior is different in that product edition.

Unless otherwise specified, any statement of optional behavior in this specification that is prescribed using the terms "SHOULD" or "SHOULD NOT" implies product behavior in accordance with the SHOULD or SHOULD NOT prescription. Unless otherwise specified, the term "MAY" implies that the product does not follow the prescription.
7 Change Tracking

This section identifies changes that were made to this document since the last release. Changes are classified as Major, Minor, or None.

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

- A document revision that incorporates changes to interoperability requirements.
- A document revision that captures changes to protocol functionality.

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

The revision class **None** means that no new technical changes were introduced. Minor editorial and formatting changes may have been made, but the relevant technical content is identical to the last released version.

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

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<tr>
<td>6 Appendix B: Product Behavior</td>
<td>Updated list of supported products.</td>
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