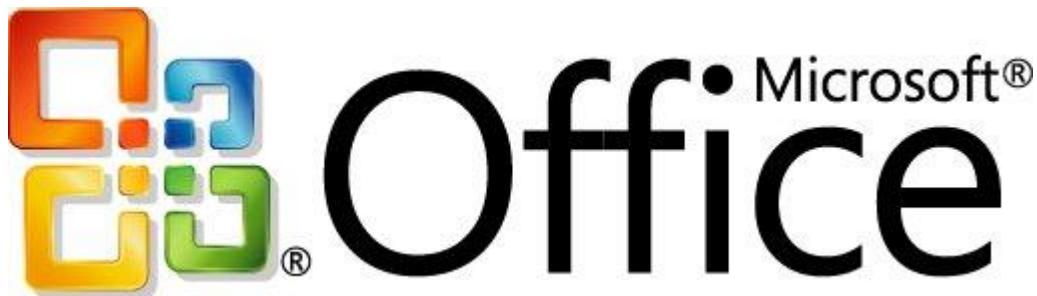


**MICROSOFT OFFICE EXCEL 2007
BINARY FILE FORMAT SPECIFICATION
[*.x1sb]**





Microsoft Office Excel 2007

Binary File Format (.xlsb) Specification

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Introduction

DOCUMENT FORMAT AND STRUCTURE

When a workbook is saved in the Binary Workbook (*.xlsb) format, the file parts describing the spreadsheet data are saved in BIFF (Binary Interchange File Format), and packaged as described in the Office Open XML Ecma Standard 376. These parts include:

- Workbook
- Metadata
- Styles
- Strings
- Sheets (Worksheet/Chartsheet/Dialsheet/Macrosheet/Sheet Index)
- Calculation Parts (CalcChain/Volatile Dependencies)
- Pivot Table Parts (PivotCache/PivotTable/External Connections)
- Table Parts (Table/Query Table)
- Revision Parts (User Names/Revision Headers/Revisions)
- Supplementary Data
- Comments

Each BIFF part is saved as a series of BIFF records. Although different BIFF record types contain different information, every record has the same basic format. Please note that these BIFF records differ in format and style from previous BIFF records in earlier versions of Microsoft Excel. See the [Record Structure](#) documentation for more information in this area.

Parts found in the XLSB package that are not in binary format include the Office Drawing parts as well as the Relationship and Microsoft Office related parts. These parts are not covered in this document. For information on these parts, as well as information on core package format and structure, please refer to the Office Open XML Ecma Standard 376 Specification.

RECORD STRUCTURE

Record Number (RT) and Size (CB)

Each record begins with a record number (`RT`), followed by a record size (`CB`). These two items are then followed by the record fields.

The `RT` can be one or two bytes. The high bit in the low byte indicates a two byte `RT`. The one byte `RTs` are reserved for commonly used records.

The `CB` can be one to four bytes. The high bit in each byte indicates an additional byte is needed to form a full `CB`. `RTCONTINUE` is no longer used.

For instance if a `BRCOMMENTTEXT` record is written out, then the `RT` value would be `11111101 00000100`: The first byte is `11111101`, implying a low value of 125 and a second byte, the second byte is `00000100`, implying a high value of $4 * 128 = 512$. $125 + 512 = 637$.

Offset/Position

In each record's field description table, there is an offset column. This offset column describes the offset of a field in bytes (or bits in the case of a grbit) OR describes a field's priority.

An offset is marked as the field's offset from the `CB` of the record.

A position value of `Px` means that this is the x^{th} item that should be written out after the static data chunk (i.e., the data that has an established numerical offset). So `P1` is written first, followed by `P2`. If `P1` is not written out, `P2` would be the first item written. If there are fields that are exclusive to each other, they may all have the same priority value.

RGs

`RGs` are arrays. Each array has a four byte, signed integer `count` preceding it. If the value of `count` is `-1`, then the array is assumed to be null. If the value of `count` is `0`, then an array of size zero is allocated. If the value of `count` is greater than `0`, then an array of the specified size is allocated. Each item of the array is `X` bytes large, where `X` is specified after the `RG`.

For instance, if an array is listed as size `RG 4`, then an array with a count of three will be a sixteen byte structure represented as follows:

RG 4 object
4 byte count
4 byte rg[0]
4 byte rg[1]
4 byte rg[2]

STRs

`STRs` are strings; more specifically, an array of 16-bit Unicode characters in UTF16 little-endian encoding. Each string has a four byte, signed integer `cch` preceding it. If the value of `cch` is `-1`, then the string is assumed to be null. If the value of `cch` is `0`, then a string with zero characters is allocated. If the value of `cch` is `X`, then a string of size `X` is allocated. The maximum size of a string is generally 32767 characters.

REFs

`REFs` are cell references. The `REF` is a 16 byte structure consisting of four unsigned integers representing the rows and columns of the reference. A value of `-1` implies an invalid row or column. The `REF` structure is as follows:

Structure data			
Offset	Field Name	Size	Contents
0	<code>rwFirst</code>	4	First row of the cell reference
4	<code>rwLast</code>	4	Last row of the cell reference
8	<code>colFirst</code>	4	First column of the cell reference
12	<code>colLast</code>	4	Last column of the cell reference

SQREFs

`SQREFs` are arrays of `REFs` representing multiple blocks of cells. Each `SQREF` has a four byte, signed integer `count` preceding it. If the value of `count` is `-1`, then the `SQREF` is assumed to

be null. If the value of `count` is 0, then a `SQREF` of size zero is allocated. If the value of `count` equals X, then a `SQREF` with X `REFs` is allocated.

FMLAs

`FMLAs` are variable size descriptions of formulas. See the [FORMULAS](#) section for more information.

NUMs

`NUMs` are eight byte numbers in IEEE floating point format.

Cell Table

This section describes the structures that are found within the cell table: Cells, Cell Metadata, Formula Records, and Row Headers. Commonly used structures within records in the cell table are as follows:

RTCOLSPAN

Size 8

Description of a span of populated columns within a row. This is not a BIFF record, but rather a subrecord that is shared by many BIFF records.

Record data

Offset	Field Name	Size	Contents
0	colMic	4	The first column in the span
4	colLast	4	The last column in the span

Offset	Field Name	Size	Contents
0	colMic	4	The first column in the span
4	colLast	4	The last column in the span

RTCELL

Size 8

Core description of a cell containing its style, phonetic, and column information. This is not a BIFF record, but rather a subrecord that is shared by many BIFF records.

Record data

Offset	Field Name	Size	Contents
0	col	4	The column of the cell
4	grbit1	4	See grbit1 description below.

Offset	Field Name	Size	Contents
0	col	4	The column of the cell
4	grbit1	4	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	ixfe	24	Index into the <u>STYLES</u> Part determining the style of the cell
24	fPhShow	1	=1 if show phonetic
25	unused	7	Reserved

Offset	Field Name	Bits	Contents
0	ixfe	24	Index into the <u>STYLES</u> Part determining the style of the cell
24	fPhShow	1	=1 if show phonetic
25	unused	7	Reserved

RTCELL0

Size 4

Core description of a cell containing its style and phonetic information. Column information is not included; instead the column is assumed because the current cell is adjacent to the previous populated cell. This is not a BIFF record, but rather a subrecord that is shared by many BIFF records.

Record data**Offset Field Name Size Contents**

0	grbit1	4	See grbit description below.
---	--------	---	------------------------------

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	ixfe	24	Index into the STYLES Part determining the style of the cell
24	fPhShow	1	=1 if show phonetic
25	unused	7	Reserved

BRTROWHDR

Record 0, Variable Size

This record describes the row properties for a row of cells.

Record data**Offset Field Name Size Contents**

0	rw	4	Row number
4	ixfe	4	Index into the STYLES Part determining the style of the cells in this row.
8	miyRw	2	Row height in twips
10	grbit1	1	See grbit description below.
11	grbit2	1	See grbit description below.
12	grbit3	1	See grbit description below.
13	rgcolspan	RG 8	An array of <u>RTCOLSPANS</u> used to describe the populated columns in the row.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fExtraAsc	1	=1 if the row has a thick top border by default
1	fExtraDesc	1	=1 if the row has a thick bottom border by default
2	unused	6	Reserved

The grbit2 field contains the following flags and fields:

Offset Field Name Bits Contents

0	iOutLevel	3	Outlining level of the row
3	fCollapsed	1	=1 if the row is collapsed in outlining
4	fDyZero	1	=1 if the row is hidden
5	fUnsynced	1	=1 if the row height is manually set
6	fGhostDirty	1	=1 if the row style should be applied

7	unused	1	Reserved
---	--------	---	----------

The `grbit3` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fPhShow</code>	1	=1 if show phonetic for this row
1	unused	7	Reserved

BRTCELLBLANK

Record 1, Size 8

Worksheet record referring to a blank cell

Record data

Offset	Field Name	Size	Contents
0	<code>rtcell</code>	8	<u>RTCELL</u>

BRTCELLRK

Record 2, Size 12

Worksheet record referring to a cell containing an `RK`

Record data

Offset	Field Name	Size	Contents
0	<code>rtcell</code>	8	<u>RTCELL</u>
8	<code>rk</code>	4	<code>RK</code> value in the cell

BRTCELLERROR

Record 3, Size 9

Worksheet record referring to a cell containing an error description

Record data

Offset	Field Name	Size	Contents
0	<code>rtcell</code>	8	<u>RTCELL</u>
8	<code>bError</code>	1	Error in the cell 0= #NULL! (a null range reference) 7= #DIV0! (divide by zero) 15= #VALUE! (an invalid value) 23= #REF! (an invalid cell reference) 29= #NAME? (an unrecognized name/label) 36= #NUM! (an invalid number) 42= #N/A (no value available)

BRTCELLBOOL

Record 4, Size 9

Worksheet record referring to a cell containing a Boolean value

Record data**Offset Field Name Size Contents**

0	rtcell	8	<u>RTCELL</u>
8	fBool	1	Boolean value in the cell

BRTCELLREAL

Record 5, Size 16

Worksheet record referring to a cell containing a NUM

Record data**Offset Field Name Size Contents**

0	rtcell	8	<u>RTCELL</u>
8	num	8	NUM value in the cell

BRTCELLST

Record 6, Variable Size

Worksheet record referring to a cell, not string-table related

Record data**Offset Field Name Size Contents**

0	rtcell	8	<u>RTCELL</u>
8	str	STR	Array of 16-bit Unicode characters in UTF16 little-endian encoding.

BRTCELLISST

Record 7, Size 12

Worksheet record referring to a cell with a plain text inline string (not in string table)

Record data**Offset Field Name Size Contents**

0	rtcell	8	<u>RTCELL</u>
8	isst	4	Index of the string in the shared string table

BRTFMLASTRING

Record 8, Variable Size

A cell record which contains a formula that evaluated to a string result on the most recent evaluation.

Record data			
Offset	Field Name	Size	Contents
0	rtcell	8	RTCELL
P1	str	STR	String contents of the record
P2	grbit1	2	See grbit description below.
P3	FMLA	FMLA	Formula

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	unused	1	Reserved
1	fAlwaysCalc	1	=1 if this formula needs to be reevaluated
2	unused	14	Reserved

BRTFMLANUM

Record 9, Variable Size

A cell record which contains a formula that evaluates to a number result on the most recent evaluation.

Record data			
Offset	Field Name	Size	Contents
0	rtcell	8	RTCELL
8	num	8	Number stored in 8 byte IEEE format
16	grbit1	2	See grbit description below.
18	FMLA	FMLA	Formula

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	unused	1	Reserved
1	fAlwaysCalc	1	=1 if this formula needs to be reevaluated
2	unused	14	Reserved

BRTFMLABOOL

Record 10, Variable Size

A cell record which contains a formula that evaluates to a Boolean result on the most recent evaluation.

Record data			
Offset	Field Name	Size	Contents
0	rtcell	8	RTCELL
8	bool	1	Boolean contents of the record

9	grbit1	2	See grbit description below.
11	FMLA	FMLA	Formula

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
--------	------------	------	----------

0	unused	1	Reserved
1	fAlwaysCalc	1	=1 if this formula needs to be reevaluated
2	unused	14	Reserved

BRTFMLAERROR

Record 11, Variable Size

A cell record which contains a formula which causes an error code on evaluation result on the most recent evaluation.

Record data			
Offset	Field Name	Size	Contents

0	rtcell	8	<u>RTCELL</u>
8	error	1	Error code for the record
9	grbit1	2	See grbit description below.
11	FMLA	FMLA	Formula

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
--------	------------	------	----------

0	unused	1	Reserved
1	fAlwaysCalc	1	=1 if this formula needs to be reevaluated
2	unused	14	Reserved

BRTCELL0BLANK

Record 12, Size 4

Worksheet record referring to a blank cell

Record data			
Offset	Field Name	Size	Contents

0	rtcell0	4	<u>RTCELL0</u>
---	---------	---	----------------

BRTCELL0RK

Record 13, Size 8

Worksheet record referring to a cell containing an RK

Record data			
Offset	Field Name	Size	Contents
0	rtcell0	4	<u>RTCELL0</u>
4	rk	4	RK value in the cell

BRTCELL0BOOL

Record 15, Size 5

Worksheet record referring to a cell containing a Boolean value

Record data			
Offset	Field Name	Size	Contents
0	rtcell0	4	<u>RTCELL0</u>
4	fBool	1	Boolean value in the cell

BRTCELL0REAL

Record 16, Size 12

Worksheet record referring to a cell containing a NUM

Record data			
Offset	Field Name	Size	Contents
0	rtcell0	4	<u>RTCELL0</u>
4	num	8	NUM value in the cell

BRTCELL0ST

Record 17, Variable Size

Worksheet record referring to a cell with a plain text inline string (not in string table)

Record data			
Offset	Field Name	Size	Contents
0	rtcell0	4	<u>RTCELL0</u>
4	str	STR	Array of 16-bit Unicode characters in UTF16 little-endian encoding.

BRTCELL0ISST

Record 18, Size 8

Worksheet record referring to a cell, string-table related

Record data			
Offset	Field Name	Size	Contents
0	rtcell0	4	<u>RTCELL0</u>
4	isst	4	Index of the string in the shared string table

BRTCELLMETA

Record 49, Size 4

Defines the index of the cell metadata block to be applied to the subsequent cell record.

Record data**Offset Field Name Size Contents**

0	icmb	4	Cell metadata block index
---	------	---	---------------------------

BRTVALUEMETA

Record 50, Size 4

Defines the index of the cell value's metadata block to be applied to the subsequent cell record.

Record data**Offset Field Name Size Contents**

0	ivmb	4	Cell's value metadata block index
---	------	---	-----------------------------------

BRTCELL0RSTRING

Record 61, Variable Size

Worksheet record for in-line strings (not in string table)

Record data**Offset Field Name Size Contents**

0	rtcell0	4	<u>RTCELL0</u>
4	rtrst	RSTR	<u>RTRST</u>

BRTCELLRSTRING

Record 62, Variable Size

Worksheet record for in-line strings (not in string table)

Record data**Offset Field Name Size Contents**

0	rtcell	8	<u>RTCELL</u>
8	rtrst	RSTR	<u>RTRST</u>

BRTARRFMLA

Record 426, Variable Size

A record which contains an array. Unlike the previous formula records, the result is not stored in this record.

Record data			
Offset	Field Name	Size	Contents
0	ref	16	REF reference to the cell range to which BRTARRFMLA applies
16	grbit1	1	See grbit1 description below
17	FMLA	FMLA	Formula

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fAlwaysCalc	1	=1 if this formula needs to be reevaluated
1	unused	7	Reserved

BRTSHRFMLA

Record 427, Variable Size

A record containing a shared formula.

Record data			
Offset	Field Name	Size	Contents
0	ref	16	REF reference to the cell range to which BRTSHRFMLA applies
16	FMLA	FMLA	Formula

BRTTABLE

Record 428, Size 33

Data table

Record data			
Offset	Field Name	Size	Contents
0	refFirst	16	REF range of cells in array formula or data table
16	rwInput1	4	Row of the first input cell for data table
20	colInput1	4	Column of the first input cell for data table
24	rwInput2	4	Row of the second input cell for data table, if fTbl2 equals one.
28	colInput2	4	Column of the second input cell for data table, if fTbl2 equals one.
32	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fRw	1	=1 if this one-dimensional data table is a row =0 if this is a column
1	fTbl2	1	=1 if the data table is two-dimensional
2	fDeleted	1	=1 if the first input cell for data table has been deleted
3	fDeleted2	1	=1 if the second input cell for data table has been deleted
4	fAlwaysCalc	1	=1 if it is necessary to always calculate this data table
5	unused	3	Reserved

Dialogsheet Part

Sheets are the central structures within a workbook, and are where the user does most of their spreadsheet work. This type of sheet contains a Microsoft Excel version 5.0 dialog, along with view, page setup, and print option information. Microsoft Excel version 5.0 dialog sheets have been replaced by UserForms. It is recommended that you use forms rather than Microsoft Excel version 5.0 dialogs in your custom application.

RECORD ORDER

brtBeginSheet [Record 129]

 brtWsProp [Record 147] (occurs 0 to 1 times)

 brtBeginWsViews [Record 133] (occurs 0 to 1 times)

 brtBeginWsView [Record 137] (occurs 1 or more times)

 brtPane [Record 151] (occurs 0 to 1 times)

 brtSel [Record 152] (occurs 0 to 4 times)

 brtBeginSXSELECT [Record 307] (occurs 0 to 4 times)

 <PivotRule Records>

 brtEndSXSELECT [Record 308]

 brtEndWsView [Record 138]

 brtEndWsViews [Record 134]

 brtWsFmtInfo [Record 485] (occurs 0 to 1 times)

 brtSheetProtection [Record 535] (occurs 0 to 1 times)

 brtBeginUserShViews [Record 422] (occurs 0 to 1 times)

 brtBeginUserShView [Record 423] (occurs 1 or more times)

 brtPane [Record 151] (occurs 0 to 1 times)

 brtSel [Record 152] (occurs 0 to 1 times)

 brtBeginRwBrk [Record 392] (occurs 0 to 1 times)

 brtBrk [Record 396] (occurs 0 or more times)

 brtEndRwBrk [Record 393] (occurs 0 to 1 times)

 brtBeginColBrk [Record 394]

 brtBrk [Record 396] (occurs 0 or more times)

 brtEndColBrk [Record 395]

 brtMargins [Record 476] (occurs 0 to 1 times)

 brtPrintOptions [Record 477] (occurs 0 to 1 times)

 brtPageSetup [Record 478] (occurs 0 to 1 times)

 <Header/Footer Records> (occurs 0 to 1 times)

<AutoFilter Records> (occurs 0 to 1 times)
 brtEndUserShView [Record 424]
 brtEndUserShViews [Record 425]
 brtPrintOptions [Record 477] (occurs 0 to 1 times)
 brtMargins [Record 476] (occurs 0 to 1 times)
 <Header/Footer Records> (occurs 0 to 1 times)
 brtPageSetup [Record 478] (occurs 0 to 1 times)
 brtDrawing [Record 550] (occurs 0 to 1 times)
 brtLegacyDrawing [Record 551] (occurs 0 to 1 times)
 brtLegacyDrawingHF [Record 552] (occurs 0 to 1 times)
 brtBkhim [Record 562] (occurs 0 to 1 times)
 brtBeginOleObjects [Record 638] (occurs 0 to 1 times)
 brtOleObject [Record 639] (occurs 1 or more times)
 brtEndOleObjects [Record 640]
brtEndSheet [Record 130]

Macrosheet Part

Sheets are the central structures within a workbook, and are where the user does most of their spreadsheet work. This type of sheet contains a Microsoft Excel version 4.0 macro sheet, along with view, page setup, and print option information.

RECORD ORDER

brtBeginSheet [Record 129]

 brtWsProp [Record 147] (occurs 0 to 1 times)

 brtWsDim [Record 148] (occurs 0 to 1 times)

 brtBeginWsViews [Record 133] (occurs 0 to 1 times)

 brtBeginWsView [Record 137] (occurs 1 or more times)

 brtPane [Record 151] (occurs 0 to 1 times)

 brtSel [Record 152] (occurs 0 to 4 times)

 brtBeginSXSELECT [Record 307] (occurs 0 to 4 times)

 <PivotRule Records>

 brtEndSXSELECT [Record 308]

 brtEndWsView [Record 138]

 brtEndWsViews [Record 134]

 brtWsFmtInfo [Record 485] (occurs 0 to 1 times)

 brtBeginColInfos [Record 390] (occurs 0 or more times)

 brtColInfo [Record 60] (occurs 1 or more times)

 brtEndColInfos [Record 391]

 brtBeginSheetData [Record 145]

 brtRowHdr [Record 0] (occurs 0 or more times)

Per cell, the following items are written:

 brtTable [Record 428] (occurs 0 to 1 times)

 brtCellMeta [Record 49] (occurs 0 to 1 times)

 brtValueMeta [Record 50] (occurs 0 to 1 times)

One of the following records:

 brtCellBlank [Record 1]

 brtCellRk [Record 2]

 brtCellError [Record 3]

 brtCellBool [Record 4]

 brtCellReal [Record 5]

 brtCellSt [Record 6]

brtCellIsst [Record 7]
brtFmlaString [Record 8]
brtFmlaNum [Record 9]
brtFmlaBool [Record 10]
brtFmlaError [Record 11]
brtCell0Blank [Record 12]
brtCell0Rk [Record 13]
brtCell0Bool [Record 15]
brtCell0Real [Record 16]
brtCell0St [Record 17]
brtCell0Isst [Record 18]
brtCellRString [Record 61]
brtCell0RString [Record 62]

40 to 1 of the following 2 records:

brtShrFmla [Record 426]
brtArrFmla [Record 427]

brtEndSheetData [Record 146]
brtSheetCalcProp [Record 663] (occurs 0 to 1 times)
brtSheetProtection [Record 535] (occurs 0 to 1 times)
<Autofilter Records> (occurs 0 to 1 times)
<SortState Records> (occurs 0 to 1 times)
brtBeginDcon [Record 495] (occurs 0 to 1 times)
 brtBeginDrefs [Record 497] (occurs 0 to 1 times)
 brtDref [Record 499] (occurs 0 or more times)
 brtEndDrefs [Record 498]
brtEndDcon [Record 496]
brtBeginUserShViews [Record 422] (occurs 0 to 1 times)
 brtBeginUserShView [Record 423] (occurs 1 or more times)
 brtPane [Record 151] (occurs 0 to 1 times)
 brtSel [Record 152] (occurs 0 to 1 times)
 brtBeginRwBrk [Record 392] (occurs 0 to 1 times)
 brtBrk [Record 396] (occurs 0 or more times)
 brtEndRwBrk [Record 393] (occurs 0 to 1 times)
 brtBeginColBrk [Record 394]
 brtBrk [Record 396] (occurs 0 or more times)
 brtEndColBrk [Record 395]

brtMargins [Record 476] (occurs 0 to 1 times)
brtPrintOptions [Record 477] (occurs 0 to 1 times)
brtPageSetup [Record 478] (occurs 0 to 1 times)
<Header/Footer Records> (occurs 0 to 1 times)
<AutoFilter Records> (occurs 0 to 1 times)
brtEndUserShView [Record 424]
brtEndUserShViews [Record 425]
brtPhoneticInfo [Record 537] (occurs 0 to 1 times)
brtBeginConditionalFormatting [Record 461] (occurs 0 or more times)
 brtBeginCFRule [Record 463] (occurs 1 or more times)
 brtBeginColorScale [Record 469] (occurs 0 to 1 times)
 brtCFVO [Record 471] (occurs 2 or more times)
 brtColor [Record 564] (occurs 2 or more times)
 brtEndColorScale [Record 470]
 brtBeginDataBar [Record 467] (occurs 0 to 1 times)
 brtCFVO [Record 471] (occurs 2 or more times)
 brtColor [Record 564] (occurs 2 or more times)
 brtEndDataBar [Record 468]
 brtBeginIconSet [Record 465] (occurs 0 to 1 times)
 brtCFVO [Record 471] (occurs 2 or more times)
 brtEndIconSet [Record 466]
 brtEndCFRule [Record 464]
brtEndConditionalFormatting [Record 462]
brtPrintOptions [Record 477] (occurs 0 to 1 times)
brtMargins [Record 476] (occurs 0 to 1 times)
<Header/Footer Records> (occurs 0 to 1 times)
brtPageSetup [Record 478] (occurs 0 to 1 times)
brtBeginRwBrk [Record 392] (occurs 0 to 1 times)
 brtBrk [Record 396] (occurs 0 or more times)
brtEndRwBrk [Record 393] (occurs 0 to 1 times)
brtBeginColBrk [Record 394] (occurs 1 or more times)
 brtBrk [Record 396] (occurs 0 or more times)
brtEndColBrk [Record 395]
brtBigName [Record 625] (occurs 0 or more times)
brtDrawing [Record 550] (occurs 0 to 1 times)
brtLegacyDrawing [Record 551] (occurs 0 to 1 times)

brtLegacyDrawingHF [Record 552] (occurs 0 to 1 times)
brtBkhim [Record 562] (occurs 0 to 1 times)
brtBeginOleObjects [Record 638] (occurs 0 to 1 times)
 brtOleObject [Record 639] (occurs 1 or more times)
 brtEndOleObjects [Record 640]
brtEndSheet [Record 130]

Worksheet Part

Sheets are the central structures within a workbook, and are where the user does most of their spreadsheet work. The most common type of sheet is the worksheet, which is represented as a grid of cells. Worksheet cells can contain text, numbers, dates, and formulas. Cells can be formatted as well. Workbooks usually contain more than one sheet. To aid in the analysis of data and making informed decisions, spreadsheet applications often implement features and objects which help calculate, sort, filter, organize, and graphically display information. Since these features are often connected very tightly with the spreadsheet grid, these are also included in the sheet definition on disk.

Note that sheet information is organized into three main sections:

- Top-level sheet properties (everything before `BRTBEGINSHEETDATA`)
- The cell table (see the `CELLTABLE` section)
- Supporting sheet features (everything after `BRTENDSHEETDATA`)

RECORD ORDER

`brtBeginSheet` [Record 129]

`brtWsProp` [Record 147] (occurs 0 to 1 times)
`brtWsDim` [Record 148] (occurs 0 to 1 times)
`brtBeginWsViews` [Record 133] (occurs 0 to 1 times)
 `brtBeginWsView` [Record 137] (occurs 1 or more times)
 `brtPane` [Record 151] (occurs 0 to 1 times)
 `brtSel` [Record 152] (occurs 0 to 4 times)
 `brtBeginSXSELECT` [Record 307] (occurs 0 to 4 times)
 <Pivot Rule Records>
 `brtEndSXSELECT` [Record 308]

`brtEndWsView` [Record 138]

`brtEndWsViews` [Record 134]
`brtWsFmtInfo` [Record 485] (occurs 0 to 1 times)
`brtBeginColInfos` [Record 390] (occurs 0 or more times)
 `brtColInfo` [Record 60] (occurs 1 or more times)
`brtEndColInfos` [Record 391]
`brtBeginSheetData` [Record 145]

`brtRowHdr` [Record 0] (occurs 0 or more times)

Per cell, the following items are written:

`brtTable` [Record 428] (occurs 0 to 1 times)
`brtCellMeta` [Record 49] (occurs 0 to 1 times)

brtValueMeta [Record 50] (occurs 0 to 1 times)

One of the following records:

brtCellBlank [Record 1]

brtCellRk [Record 2]

brtCellError [Record 3]

brtCellBool [Record 4]

brtCellReal [Record 5]

brtCellSt [Record 6]

brtCellIsst [Record 7]

brtFmlaString [Record 8]

brtFmlaNum [Record 9]

brtFmlaBool [Record 10]

brtFmlaError [Record 11]

brtCell0Blank [Record 12]

brtCell0Rk [Record 13]

brtCell0Bool [Record 15]

brtCell0Real [Record 16]

brtCell0St [Record 17]

brtCell0Isst [Record 18]

brtCellRString [Record 61]

brtCell0RString [Record 62]

0 to 1 of the following 2 records:

brtShrFmla [Record 426]

brtArrFmla [Record 427]

brtEndSheetData [Record 146]

brtSheetCalcProp [Record 663] (occurs 0 to 1 times)

brtSheetProtection [Record 535] (occurs 0 to 1 times)

brtRangeProtection [Record 536] (occurs 0 or more times)

brtBeginScenMan [Record 500] (occurs 0 to 1 times)

brtBeginSct [Record 502] (occurs 1 or more times)

brtS1c [Record 504] (occurs 1 or more times)

brtEndSct [Record 503]

brtEndScenMan [Record 501]

<Autofilter Records> (occurs 0 to 1 times)

<SortState Records> (occurs 0 to 1 times)

brtBeginDcon [Record 495] (occurs 0 to 1 times)

brtBeginDrefs [Record 497] (occurs 0 to 1 times)
 brtDref [Record 499] (occurs 0 or more times)
 brtEndDrefs [Record 498]
brtEndDcon [Record 496]
brtBeginUserShViews [Record 422] (occurs 0 to 1 times)
 brtBeginUserShView [Record 423] (occurs 1 or more times)
 brtPane [Record 151] (occurs 0 to 1 times)
 brtSel [Record 152] (occurs 0 to 1 times)
 brtBeginRwBrk [Record 392] (occurs 0 to 1 times)
 brtBrk [Record 396] (occurs 0 or more times)
 brtEndRwBrk [Record 393] (occurs 0 to 1 times)
 brtBeginColBrk [Record 394]
 brtBrk [Record 396] (occurs 0 or more times)
 brtEndColBrk [Record 395]
 brtMargins [Record 476] (occurs 0 to 1 times)
 brtPrintOptions [Record 477] (occurs 0 to 1 times)
 brtPageSetup [Record 478] (occurs 0 to 1 times)
 <Header/Footer Records> (occurs 0 to 1 times)
 <AutoFilter Records> (occurs 0 to 1 times)
 brtEndUserShView [Record 424]
brtEndUserShViews [Record 425]
brtBeginMergeCells [Record 177] (occurs 0 to 1 times)
 brtMergeCell [Record 176] (occurs 1 or more times)
brtEndMergeCells [Record 178]
brtPhoneticInfo [Record 537] (occurs 0 to 1 times)
brtBeginConditionalFormatting [Record 461] (occurs 0 or more times)
 brtBeginCFRule [Record 463] (occurs 1 or more times)
 brtBeginColorScale [Record 469] (occurs 0 to 1 times)
 brtCFVO [Record 471] (occurs 2 or more times)
 brtColor [Record 564] (occurs 2 or more times)
 brtEndColorScale [Record 470]
 brtBeginDataBar [Record 467] (occurs 0 to 1 times)
 brtCFVO [Record 471] (occurs 2 or more times)
 brtColor [Record 564] (occurs 2 or more times)
 brtEndDataBar [Record 468]
 brtBeginIconSet [Record 465] (occurs 0 to 1 times)

brtCFVO [Record 471] (occurs 2 or more times)

 brtEndIconSet [Record 466]

 brtEndCFRule [Record 464]

 brtEndConditionalFormatting [Record 462]

 brtHlink [Record 494] (occurs 0 to 1 times)

 brtPrintOptions [Record 477] (occurs 0 to 1 times)

 brtMargins [Record 476] (occurs 0 to 1 times)

 <Header/Footer Records> (occurs 0 to 1 times)

 brtPageSetup [Record 478] (occurs 0 to 1 times)

 brtBeginRwBrk [Record 392] (occurs 0 to 1 times)

 brtBrk [Record 396] (occurs 0 or more times)

 brtEndRwBrk [Record 393] (occurs 0 to 1 times)

 brtBeginColBrk [Record 394] (occurs 1 or more times)

 brtBrk [Record 396] (occurs 0 or more times)

 brtEndColBrk [Record 395]

 brtBigName [Record 625] (occurs 0 or more times)

 brtBeginCellWatches [Record 605] (occurs 0 to 1 times)

 brtCellWatch [Record 607] (occurs 1 or more times)

 brtEndCellWatches [Record 606]

 brtBeginCellIgnoreECs [Record 648] (occurs 0 to 1 times)

 brtCellIgnoreEC [Record 649] (occurs 1 or more times)

 brtEndCellIgnoreECs [Record 650]

 brtBeginSmartTags [Record 594] (occurs 0 to 1 times)

 brtBeginCellSmartTags [Record 592] (occurs 1 or more times)

 brtBeginCellSmartTag [Record 590] (occurs 1 or more times)

 brtCellSmartTagProperty [Record 589] (occurs 0 or more times)

 brtEndCellSmartTag [Record 591]

 brtEndCellSmartTags [Record 593]

 brtEndSmartTags [Record 595]

 brtDrawing [Record 550] (occurs 0 to 1 times)

 brtLegacyDrawing [Record 551] (occurs 0 to 1 times)

 brtLegacyDrawingHF [Record 552] (occurs 0 to 1 times)

 brtBkhim [Record 562] (occurs 0 to 1 times)

 brtBeginOleObjects [Record 638] (occurs 0 to 1 times)

 brtOleObject [Record 639] (occurs 1 or more times)

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brtEndOleObjects [Record 640]
brtBeginActiveXControls [Record 643] (occurs 0 to 1 times)
    brtActiveX [Record 644] (occurs 1 or more times)
brtEndActiveXControls [Record 645]
brtBeginWebPubItems [Record 554] (occurs 0 to 1 times)
    brtBeginWebPubItem [Record 556] (occurs 1 or more times)
    brtEndWebPubItem [Record 557]
brtEndWebPubItems [Record 555]
brtBeginTableParts [Record 660] (occurs 0 to 1 times)
    brtTablePart [Record 661] (occurs 0 or more times)
brtEndTableParts [Record 662]
brtBeginDVals [Record 573] (occurs 0 to 1 times)
    brtDVal [Record 64] (occurs 1 or more times)
brtEndDVals [Record 574]
brtEndSheet [Record 130]

```

BRTCOLINFO

Record 60, Size 18

Defines column width and column formatting for one or more columns of the worksheet.

Record data				
Offset	Field Name	Size	Contents	
0	colFirst	4	First column affected by this 'column info' record.	
4	colLast	4	Last column affected by this 'column info' record.	

8	coldx	4	<p>Column width measured as the number of characters of the maximum digit width of the numbers 0, 1, 2, ..., 9 as rendered in the normal style's font. There are 4 pixels of margin padding (two on each side), plus 1 pixel padding for the gridlines.</p> $\text{width} = \text{Truncate}([\{\text{Number of Characters}\} * \{\text{Maximum Digit Width}\} + \{5 \text{ pixel padding}\}] / \{\text{Maximum Digit Width}\} * 256) / 256$ <p>Using the Calibri font as an example, the maximum digit width of 11 point font size is 7 pixels (at 96 dpi). In fact, each digit is the same width for this font. Therefore if the cell width is 8 characters wide, the value of this attribute shall be $\text{Truncate}([8*7+5]/7*256)/256 = 8.7109375$.</p> <p>To translate the value of width in the file into the column width value at runtime (expressed in terms of pixels), use this calculation:</p> $= \text{Truncate}(((256 * \{\text{width}\} + \text{Truncate}(128 / \{\text{Maximum Digit Width}\})) / 256) * \{\text{Maximum Digit Width}\})$ <p>Using the same example as above, the calculation would be $\text{Truncate}((256*8.7109375+\text{Truncate}(128/7))/256)*7) = 61$ pixels</p> <p>To translate from pixels to character width, use this calculation:</p> $= \text{Truncate}((\{\text{pixels}\}-5) / \{\text{Maximum Digit Width}\} * 100 + 0.5) / 100$ <p>Using the example above, the calculation would be $\text{Truncate}((61-5)/7*100+0.5)/100 = 8$ characters.</p> <p>Note: When wide borders are applied, part of the left/right border shall overlap with the 2 pixel padding on each side. Wide borders do not affect the width calculation of the column.</p> <p>Note: When the sheet is in the mode to view formulas instead of values, the pixel width of the column is doubled.</p>
12	ixfe	4	Default style for the affected column(s). Affects cells not yet allocated in the column(s). In other words, this style applies to new columns.
16	grbit1	2	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
--------	------------	------	----------

0	fHidden	1	=1 if the affected column(s) are hidden on this worksheet.
---	---------	---	--

1	fUserSet	1	=1 if the column width for the affected column(s) is different from the default or has been manually set.
2	fBestFit	1	=1 if the specified column(s) is set to 'best fit'. 'Best fit' is set to true under these conditions (both conditions must be true): The column width has never been manually set by the user The column width is not the default width 'Best fit' means that when numbers are typed into a cell contained in a 'best fit' column, the column width should automatically resize to display the number. [Note: In best fit cases, column width shall not be made smaller, only larger.]
3	fPhonetic	1	=1 if the phonetic information should be displayed by default for the affected column(s) of the worksheet.
4	unused	4	Reserved
8	iOutLevel	3	Outline level of affected column(s). Range is 0 to 7. See description of <code>fRwSumsBelow</code> and <code>fColSumsRight</code> in BRTWSPROP for detailed information.
11	unused	1	Reserved
12	fCollapsed	1	=1 if the outlining of the affected column(s) is in the collapsed state.
13	unused	3	Reserved

BRTDVAL

Record 64, Variable Size

A single item of data validation defined on a range of the worksheet.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See <code>grbit1</code> description below.
P1	sqref	SQREF	Range over which data validation is applied.
P2	strErrorTitle	STR	Title bar text of error alert.
P3	strError	STR	Message text of error alert.
P4	strPromptTitle	STR	Title bar text of input prompt.
P5	strPrompt	STR	Message text of input prompt.
P6	FMLA	FMLA	The first formula in the DataValidation dropdown. It used as a bounds for 'between' and 'notBetween' relational operators, and the only formula used for other relational operators (equal, notEqual, lessThan, lessThanOrEqual, greaterThan, greaterThanOrEqual), or for custom or list type data validation. The content can be a formula or a constant or a list series (comma separated values).

P7	FMLA	FMLA	The second formula in the DataValidation dropdown. It is used as a bounds for 'between' and 'notBetween' relational operators only.
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The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	valType	4	The type of data validation.
4	errStyle	3	The style of error alert used for this data validation.
7	fStrLookup	1	=1 if this is list-type validation with an explicitly expressed list of valid inputs
8	fAllowBlank	1	=1 if the data validation treats empty or blank entries as valid (do not violate the validation constraints).
9	fsuppressCombo	1	=1 if display the dropdown combo box for a list type data validation.
10	mdImeMode	8	The IME (input method editor) mode enforced by this data validation. Only applies for these languages: Chinese Simplified Chinese Traditional Japanese Korean The input for the cell can be restricted to specific sets of characters, as specified by the value of <code>mdImeMode</code> . 0= No Control 1= On 2 = Off 4 = Hiragana 5 = Katakana 6 = Katakana Half 7 = Alpha Full 8 = Alpha 9 = Hangul Full 10 = Hangul
18	fShowInputMsg	1	=1 if display the input prompt message.
19	fShowErrorMsg	1	=1 if display the error alert message when an invalid value has been entered, according to the criteria specified.
20	typOperator	4	=0 if operator type is between =1 if operator type is not between =2 if operator type is equal to =3 if operator type is not equal to =4 if operator type is greater than =5 if operator type is less than =6 if operator type is greater than or equal to =7 if operator type is less than or equal to
24	unused	8	Reserved

BRTBEGINSHEET

Record 129, Size 0

This record marks the beginning of Sheet Parts.

BRTENDSHEET

Record 130, Size 0

This record marks the end of Sheet Parts.

BRTBEGINWSVIEWS

Record 133, Size 0

Worksheet views collection.

BRTENDWSVIEWS

Record 134, Size 0

The end of a worksheet views collection.

BRTBEGINWSVIEW

Record 137, Size 30

A single sheet view definition. When more than 1 sheet view is defined in the file, it means that when opening the workbook, each sheet view corresponds to a separate window within the spreadsheet application, where each window is showing the particular sheet containing the same tab id, the last sheet view definition is loaded, and the others are discarded. When multiple windows are viewing the same sheet, multiple sheet view records (with corresponding workbook view entries) are saved.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	xlView	4	Indicates view type.
6	rwTop	4	Location of the top left visible cell in the bottom right pane in this custom view (when in Left-to-Right mode).
10	colLeft	4	Location of the top left visible cell Location of the top left visible cell in the bottom right pane (when in Left-to-Right mode).
14	icvHdr	4	Index to the color value for row/column text headings and gridlines. This is an 'index color value' (ICV) rather than rgb value.
18	wScale	2	Window zoom magnification for current view representing percent values. Valid values range from 10 to 400. Horizontal & Vertical scale together. Current view can be Normal, Page Layout, or Page Break Preview.
20	wScaleNormal	2	Zoom magnification to use when in normal view, representing percent values. Valid values range from 10 to 400. Horizontal & Vertical scale together. Applies for worksheet sheet type only; zero implies the automatic setting.

22	wScaleSLV	2	Zoom magnification to use when in page break preview, representing percent values. Valid values range from 10 to 400. Horizontal & Vertical scale together. Applies for worksheet only; zero implies the automatic setting.
24	wScalePLV	2	Zoom magnification to use when in page layout view, representing percent values. Valid values range from 10 to 400. Horizontal & Vertical scale together. Applies for worksheet sheet type only; zero implies the automatic setting.
26	iwbkview	4	Zero-based index of this workbook view, pointing to a workbookView record in the bookViews collection.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fWnProt	1	=1 if the panes in the window are locked due to workbook protection. This is an option when the workbook structure is protected.
1	fDspFmla	1	=1 if this sheet should display formulas.
2	fDspGrid	1	=1 if this sheet should display gridlines.
3	fDspRwCol	1	=1 if the sheet should display row and column headings.
4	fDspZeros	1	=0 if cells with zero value appear blank instead of showing the number zero. =1 if the window should show 0 (zero) in cells containing zero value.
5	fRightToLeft	1	=1 if the sheet is in 'right to left' display mode. When in this mode, Column A is on the far right, Column B is one column left of Column A, and so on. Also, information in cells is displayed in the Right to Left format.
6	fSelected	1	=1 if this sheet is selected. When only 1 sheet is selected and active, this value should be in sync with the activeTab value. In case of a conflict, the Start Part setting wins and sets the active sheet tab. Note: multiple sheets can be selected, but only one sheet can be active at one time.
7	fDspRuler	1	=1 if the ruler shown in Page Layout View.
8	fDspGuts	1	=1 if the sheet has outline symbols visible.
9	fDefaultHdr	1	=1 if the consuming application should use the default grid lines color (system dependent). Overrides any color specified in icvHdr.
10	fWhitespace Hidden	1	=0 if page layout view doesn't display left, right, top (header), and bottom (footer) margins (even when there is data in the header or footer). =1 if page layout view displays margins.
11	unused	5	Reserved

BRTENDWSVIEW

Record 138, Size 0

The end of a single sheet view definition.

BRTBEGINSHEETDATA

Record 145, Size 0

This record marks the beginning of the cell table data.

BRTEENDSHEETDATA

Record 146, Size 0

This record marks the end of the cell table data.

BRTWSPROP

Record 147, Variable Size

This record contains sheet level properties

Record data			
Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	grbit2	1	See grbit2 description below.
3	brtColorTab	8	The color of the worksheet's tab. See description of BRTCOLOR in STYLES part.
11	rwSync	4	Anchor row for the worksheet's window.
15	colSync	4	Anchor column for the worksheet's window.
19	strCodeName	STR	Specifies a stable name of the sheet, which should not change over time, and does not change from user input. This name should be used by code to reference a particular sheet.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fShowAutoBrks	1	=1 if the sheet displays Automatic Page Breaks.
1	unused	2	Reserved
3	fPublished	1	=1 if the worksheet is published.
4	fDialog	1	=1 if the sheet is a dialog sheet
5	fApplyStyles	1	Flag indicating whether to apply styles in an outline, when outline is applied.

6	fRwSumsBelow	1	=0 if a summary row is inserted above the detailed data being summarized and a new outline level is established on that row. =1 if a summary row is inserted below the detailed data being summarized and a new outline level is established on that row. [Note that toggling this flag on existing outlines requires an update to cell table, specifically, putting the summary functions in the proper rows, and flagging these rows as new outline levels, and possibly resetting their collapsed state.]
7	fColSumsRight	1	=0 if a summary column is inserted to the left of the detailed data being summarized and a new outline level is established on that column. =1 if a summary column is inserted to the right of the detailed data being summarized and a new outline level is established on that column. [Note that toggling this flag on existing outlines requires an update to cell table, specifically, putting the summary functions in the proper columns, and flagging these columns as new outline levels, and possibly resetting their collapsed state.]
8	fFitToPage	1	=1 if the Fit to Page print option is enabled.
9	unused	1	Reserved
10	fDspGuts	1	=1 if outline symbols are displayed
11	unused	1	Reserved
12	fSyncHoriz	1	=1 if this worksheet is horizontally synced to the <code>rwSync</code> anchor point.
13	fSyncVert	1	=1 if this worksheet is vertically synced to the <code>colSync</code> anchor point.
14	fAee	1	=1 if the Transition Formula Evaluation (Lotus compatibility) option is enabled.
15	fAfe	1	=1 if the Transition Formula Entry (Lotus compatibility) option is enabled.

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fFilterMode	1	=1 if the worksheet autoFilter or advanced filter is filtered.
1	fCondFmtCalc	1	=1 if conditional formatting conditions should be evaluated.
2	unused	6	Reserved

BRTWSDIM

Record 148, Size 16

This record specifies the used range of the worksheet. It specifies the row and column bounds of used cells in the worksheet. Used cells include cells with formulas, text content, and cell formatting. When an entire column is formatted, only the first cell in that column is considered used.

Record data**Offset Field Name Size Contents**

0	ref	16	The row and column bounds of all cells in this worksheet, represented in REF form. Corresponds to the range that would contain all c records written under sheetData. Does not support whole column or whole row reference notation.
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BRTPANE

Record 151, Size 29

Worksheet view pane.

Record data**Offset Field Name Size Contents**

0	numXSplit	8	Horizontal position of the split, in 1/20th of a point; 0 (zero) if none. If the pane is frozen, this value indicates the number of columns visible in the top pane. Represented in NUM form.
8	numYSplit	8	Vertical position of the split, in 1/20th of a point; 0 (zero) if none. If the pane is frozen, this value indicates the number of rows visible in the left pane. Represented in NUM form.
16	rwTop	4	Location of the top left visible cell in the bottom right pane (when in Left-To-Right mode).
20	colLeft	4	Location of the top left visible cell in the bottom right pane (when in Left-To-Right mode).
24	pnnAct	4	The pane that is active.
28	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fFrozen	1	=1 if the panes in the window should be frozen. If fFrozenNoSplit equals zero, the panes in the window are split.
1	fFrozenNoSplit	1	=1 if the panes in the window are frozen but there is no split.
2	unused	6	Reserved

BRTSEL

Record 152, Variable Size

Worksheet view selection.

Record data**Offset Field Name Size Contents**

0	pnn	4	The pane to which this selection belongs.
4	rwAct	4	Row location of the active cell.
8	colAct	4	Column location of the active cell.

12	dwRefAct	4	0-based index of the range reference (in the array of references listed in sqref) containing the active cell. Only used when the selection in sqref is not contiguous. Therefore, this value needs to be aware of the order in which the range references are written in sqref. When this value is out of range then the active cell can be used.
16	sqref	SQREF	Range of the selection. Can be non-contiguous set of ranges.

BRTMERGECELL

Record 176, Size 16

A single merged cell

Record data

Offset	Field Name	Size	Contents
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0	ref	16	Range defined by merge cell, represented in REF form.
---	-----	----	---

BRTBEGINMERGECELLS

Record 177, Size 4

This collection expresses all the merged cells in the sheet.

Record data

Offset	Field Name	Size	Contents
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0	cmcs	4	A count of merged cell collections.
---	------	---	-------------------------------------

BRTENDMERGECELLS

Record 178, Size 0

The end of a collection of records expressing all the merged cells in the sheet.

BRTBEGINSXSELECT

Record 307, Variable Size

A collection of PivotTable structure selections. A PivotTable structure selection is a way of specifying what cells in the PivotTable are selected. Instead of specifying cell addresses in a sqref, a particular area or structure within the PivotTable is specified. In this way there is semantic meaning regarding what is selected, rather than simply a list of cell or ranges contained in the selection. Typically fields on the row or column axis are selected.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	pnn	4	The pane to which this PivotTable structure selection belongs.
4	grbit1	2	See grbit1 description below.
6	sxaxisAct	1	Axis of the PivotTable on which this selection lies.

7	iDimAct	4	Indicates the field level within the axis that is selected (zero-based index).
11	iLiStart	4	The line the structure selection begins (zero-based). This is the line clicked to initiate the structure selection.
15	iLiMic	4	The minimum line the structure selection contains.
19	iLiMac	4	The maximum line the structure selection contains.
23	rwAct	4	The row (zero-based) of active cell for structure selection.
27	colAct	4	The column (zero-based) of active cell for structure selection.
31	rwPrev	4	1-based index to the row immediately above the structure selection.
35	colPrev	4	1-based index to the column immediately left of the structure selection.
39	cClick	2	Number of clicks for this structure selection. For some selection combinations, subsequent clicks on the same target area cycles the actual selection through some variances. Therefore number of clicks on the selection must be recorded, if it is desirable to restore this state of the selection cycle on load.
41	strRelID	STR	Relationship Id pointing to the particular PivotTable Part corresponding to this selection.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLabelOnly	1	=1 if the structure selection is for labels only (e.g., a grand total row is selected).
1	fDataOnly	1	=1 if the structure selection is for data only.
2	fToggleDataHeader	1	=1 if selection toggle from data only to header only to both is enabled.
3	fExtendable	1	=1 if structure selection can have additional selections added to it.
4	fSelectionClick	2	Number of selections for the structure selection.
6	unused	10	Reserved

BRTENDSXSELECT

Record 308, Size 0

The end of a collection of PivotTable structure selections.

BRTBEGINCOLINFOS

Record 390, Size 0

Defines the beginning of a collection of width and formatting information for the columns in the worksheet.

BRTENDCOLINFOS

Record 391, Size 0

Defines the end of a collection of width and formatting information for the columns in the worksheet.

BRTBEGINRWBRK

Record 392, Size 8

Horizontal page break information used for print layout view, page layout view, drawing print breaks in normal view, and for printing the worksheet.

Record data**Offset Field Name Size Contents**

0	ibrkMac	4	Number of breaks in the collection.
4	ibrkManMac	4	Number of manual breaks in the collection.

BRTENDRWBRK

Record 393, Size 0

End of horizontal page break information used for print layout view, page layout view, drawing print breaks in normal view, and for printing the worksheet.

BRTBEGINCOLBRK

Record 394, Size 8

Vertical page break information used for print layout view, page layout view, drawing print breaks in normal view, and for printing the worksheet.

Record data**Offset Field Name Size Contents**

0	ibrkMac	4	Number of breaks in the collection.
4	ibrkManMac	4	Number of manual breaks in the collection.

BRTENDCOLBRK

Record 395, Size 0

The end of vertical page break information

BRTBRK

Record 396, Size 20

Individual row or column breaks

Record data			
Offset	Field Name	Size	Contents
0	unrwcol	4	Zero-based row or column Id of the page break. Breaks occur above the specified row and left of the specified column.
4	uncolrwStart	4	Zero-based index of start row or column of the break. For row breaks, specifies column index; for column breaks, specifies row index.
8	uncolrwEnd	4	Zero-based index of end row or column of the break. For row breaks, specifies column index; for column breaks, specifies row index.
12	fMan	4	=1 if the break is a manually inserted break.
16	fPivot	4	=1 if a PivotTable created this break.

BRTBEGINUSERSHVIEWS

Record 422, Size 0

This collection contains information pertaining to custom sheet view definitions.

BRTBEGINUSERSHVIEW

Record 423, Size 48

This collection stores information pertaining to one custom sheet view definition. A custom view is a collection of settings defining a particular view of the sheet. These views may be selected by the user for quick access to predefined views of the sheet.

Record data			
Offset	Field Name	Size	Contents
0	guid	16	Unique identifier of this custom view. This is used to ensure uniqueness. It is generated when the view is created. Must correspond to a guid value in BRTUSERBOOKVIEW in the Workbook Part.
16	itabid	4	Specifies the internal identifier for the sheet. This identifier must be unique.
20	dwScale	4	Unsigned integer representing the print scaling for this custom view. Valid values range from 10 to 400.
24	icv	4	Index to the color value for the text in row/column headings and gridlines for this custom view. This is an 'index color value' (ICV) rather than rgb value.
28	grbit1	4	See grbit1 description below.
32	refTopLeft	16	Location of the top left visible cell in the bottom right pane in this custom view (when in Left-to-Right mode).

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fShowBrks	1	=1 if page breaks are shown in this custom view.
1	fDspFmlaSv	1	=1 if formulas are shown in this custom view.
2	fDspGridSv	1	=1 if gridlines are shown in this custom view.

3	fDspRwColSv	1	=1 if row and column headers are shown in this custom view.
4	fDspGutsSv	1	=1 if outline symbols are displayed in this custom view.
5	fDspZerosSv	1	=1 if the window should display 0 (zero) values in this custom view.
6	fHorizontal	1	=1 if the sheet is to be centered between the horizontal margins when printed.
7	fVertical	1	=1 if the sheet is to be centered between the vertical margins when printed.
8	fPrintRwCol	1	=1 to print row and column headings.
9	fPrintGrid	1	=1 to print gridlines.
10	fFitToPage	1	=1 if this view should be fit to page when printing this custom view.
11	fPrintArea	1	=1 if a print area is defined as part of this custom view.
12	fOnePrintArea	1	=1 if there is only one print area on the sheet.
13	fFilterMode	1	=1 if the view contains a filtered range.
14	fEzFilter	1	=1 if the autofilter dropdown buttons are visible in this custom view.
15	fFrozen	1	=1 if the panes in the window should be frozen. If fFrozenNoSplit equals zero, the panes in the window are split.
16	fFrozenNoSplit	1	=1 if the panes in the window are frozen but there is no split
17	fSpitV	1	=1 if the window is split vertically
18	fSplitH	1	=1 if the window is split horizontally.
19	fHiddenRw	2	2 bits true => hidden rws are defined as name
21	fHiddenCol	1	=1 if there is one or more hidden column(s) in this custom view.
22	hsState	2	Visibility state for this custom view. =0 if visibility state set to visible. =1 if visibility state set to hidden. =2 if visibility state set to very hidden (VBA only).
24	fSizeWithWn	1	=1 if the chart is sized with window (chart sheet only).
25	fFilterUnique	1	=1 if an advanced filter has been applied, and the option to filter out duplicate records from the data list has been selected, in this custom view.
26	fSheetLayoutView	1	=1 if the sheet is in sheet layout view.
27	fPageLayoutView	1	=1 if the sheet is in page layout view.
28	unused	1	Reserved
29	fRuler	1	=1 if the ruler shown in this custom view. Only applicable if this Custom View is in Page Layout View.
30	fZoomToFit	1	=1 if the custom view is zoomed to fit the window.
31	unused	1	Reserved

BRTENDUSERSHVIEW

Record 424, Size 0

The end of a collection that stores information pertaining to one custom sheet view definition.

BRTENDUSERSHVIEWS

Record 425, Size 0

The end of a collection that contains information pertaining to custom sheet view definitions.

BRTBEGINCONDITIONALFORMATTING

Record 461, Variable Size

A Conditional Format is a format, such as cell shading or font color, which a spreadsheet application can automatically apply to cells if a specified condition is true. This collection expresses conditional formatting rules applied to a particular cell or range.

Record data			
Offset	Field Name	Size	Contents
0	ccf	4	Number of conditional formats.
4	fPivot	4	=1 if this is conditional formatting associated with a PivotTable.
P1	sqref	SQREF	Range over which these conditional formatting rules apply.

BRTENDCONDITIONALFORMATTING

Record 462, Size 0

The end of a collection that expresses conditional formatting rules applied to a particular cell or range

BRTBEGINCFRULE

Record 463, Variable Size

This collection represents a description of a conditional formatting rule. Only rules with *itype* value of two (expression) support formula syntax.

Record data			
Offset	Field Name	Size	Contents
0	itype	4	Type of conditional formatting rule. 1= CellIs 2= Expression 3= Gradient color scale 4= Databar 5= Top/bottom n 6= Multistate

4	itemplate	4	Type of conditional formatting rule. 0= Expression 1= Formula 2= Gradient 3= Databar 4= Multistate 5= Filter 6= Banded Table, 7= Unique Values, 8= Contains Text, 9= Contains Blanks, 10= Contains No Blanks, 11= Contains Errors, 12= Contains No Errors, 13= Contains Formulas, 14= Contains No Formulas, 15= Time Period Today, 16= Time Period Tomorrow, 17= Time Period Yesterday, 18= Time Period Last 7 Days, 19= Time Period Last Month, 20= Time Period Next Month, 21= Time Period This Week, 22= Time Period Next Week, 23= Time Period Last Week, 24= Time Period This Month, 25= Above Average, 26= Below Average, 27= Duplicate Values, 28= Compare Columns, 29= Equal Above Average, 30= Equal Below Average,
8	dxfid	4	This is an index to a DXF record in the STYLES part indicating which cell formatting to apply when the conditional formatting rule criteria is met.
12	ipri	4	The priority of this conditional formatting rule. This value is used to determine which format should be evaluated and rendered. Lower numeric values are higher priority than higher numeric values, where '1' is the highest priority.

16	ival	4	This field can represent the following: <ul style="list-style-type: none">• If <code>itype</code> equals one (Cell Is), this is the operator in a "cell value is" conditional formatting rule.• If <code>itype</code> equals five ("top/bottom n"), this is the value of "n" in a "top/bottom n" conditional formatting rule.• If <code>itemplate</code> equals eight (Contains Text), this is the operator in a "cell value is" conditional formatting rule. 0= Text contains 1= Text does not contain 2= Text begins with 3= Text ends with• If <code>itemplate</code> is between 15 and 24, inclusive, this is the applicable time period in a "date occurring" conditional format rule.• If <code>itemplate</code> equals twenty five (Above Average), this is the number of standard deviations to include above or below the average in the conditional formatting rule. If a value is present for <code>istdddev</code> and <code>itemplate</code> equals Above Average, then this rule is automatically an "above or below N standard deviations" rule.
20	unused	8	Reserved
28	grbit1	2	See <code>grbit1</code> description below.
P1	strParam	STR	The text value in a "text contains" conditional formatting rule. Valid only when <code>itemplate</code> equals eight (Contains Text).
P2	FMLA1	FMLA	The content of this record is a formula whose calculated value specifies the criteria for the conditional formatting rule. This <code>FMLA</code> is written out only if it isn't null.
P3	FMLA2	FMLA	The content of this record is a formula whose calculated value specifies the criteria for the conditional formatting rule. This <code>FMLA</code> is written out only if it isn't null and <code>FMLA1</code> isn't null.
P4	FMLA3	FMLA	The content of this record is a formula whose calculated value specifies the criteria for the conditional formatting rule. This <code>FMLA</code> is written out only if it isn't null, <code>FMLA2</code> isn't null, and <code>FMLA1</code> isn't NULL

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
--------	------------	------	----------

0	frow	1	=1 if entire table row is formatted if the cell value matches the criteria of the conditional formatting rule. Only valid when the range is in a table object.
1	fstoptrue	1	=1 if no rules with lower priority may be applied over this rule, when this rule evaluates to true.
2	fabove	1	=1 if 'above average' rule. Valid only if <code>itemplate</code> equals twenty five (Above Average).

3	fbottom	1	Indicates whether a "top/bottom n" rule is a "bottom n" rule. Valid only if <code>itype</code> equals five ("top/bottom n"). =0 if 'top' =1 if 'bottom'
4	fpercent	1	=1 if a "top/bottom n" rule is a "top/bottom n percent" rule. Valid only if <code>itype</code> equals five ("top/bottom n").
5	unused	11	Reserved

BRTEENDCFRULE

Record 464, Size 0

The end of a collection representing a description of a conditional formatting rule.

BRTBEGINICONSET

Record 465, Size 6

Describes an icon set conditional formatting rule.

Record data

Offset Field Name Size Contents

0	iset	4	The icon set to display. 0= 3 Arrows 1= 3 Arrows Gray 2= 3 Flags 3= 3 Traffic Lights 1 4= 3 Traffic Lights 2 5= 3 Signs 6= 3 Symbols 7= 3 Symbols 2 8= 4 Arrows 9= 4 Arrows Gray 10= 4 Red To Black 11= 4 Rating 12= 4 Traffic Lights 13= 5 Arrows 14= 5 Arrows Gray 15= 5 Rating 16= 5 Quarters
4	grbit1	2	See <code>grbit1</code> description below.

The `grbit1` field contains the following flags and fields:

Offset Field Name Bits Contents

0	unused	1	Reserved
1	ficon	1	=0 if the application should show the values of the cells on which this icon set is applied.
2	freverse	1	=1 if the default order of the icons in this icon set is reversed.

3	fGTE1	1	For, determines whether the threshold value of the first icon uses the greater than or equal to operator. See BRTCFVO . =0 if 'greater than' is used =1 if 'greater than or equal to' is used.
4	fGTE2	1	For, determines whether the threshold value of the second icon uses the greater than or equal to operator. See BRTCFVO . =0 if 'greater than' is used =1 if 'greater than or equal to' is used.
5	fGTE3	1	For, determines whether the threshold value of the third icon uses the greater than or equal to operator. See BRTCFVO . =0 if 'greater than' is used =1 if 'greater than or equal to' is used.
6	fGTE4	1	For, determines whether the threshold value of the fourth icon uses the greater than or equal to operator. See BRTCFVO . =0 if 'greater than' is used =1 if 'greater than or equal to' is used.
7	unused	9	Reserved

BRTENDICONSET

Record 466, Size 0

The end of a description of an icon set conditional formatting rule.

BRTBEGINDATABAR

Record 467, Size 3

Describes a data bar conditional formatting rule. The length of the data bar for any cell can be calculated as follows:

Data bar length = blenmin + (cell value - minimum value in the range) / (maximum value in the range - minimum value in the range) * (blenmax - blenmin), where min and max length are a fixed percentage of the column width (by default, 10% and 90% respectively). The minimum difference in length (or increment amount) is 1 pixel.

Offset	Field Name	Size	Contents
0	blenmin	1	The minimum length of the data bar, as a percentage of the cell width.
1	blenmax	1	The maximum length of the data bar, as a percentage of the cell width.
2	fshowvalue	1	Indicates whether to show the values of the cells on which this data bar is applied.

BRTENDDATABAR

Record 468, Size 0

The end of a description of a data bar conditional formatting rule.

BRTBEGINCOLORSCALE

Record 469, Size 0

Describes a gradated color scale in this conditional formatting rule.

BRTENDCOLORSCALE

Record 470, Size 0

The end of a description of a gradated color scale in this conditional formatting rule.

BRTCFCVO

Record 471, Variable Size

Describes the values of the interpolation points in a gradient scale.

Record data			
Offset	Field Name	Size	Contents
0	ityp	4	The type of this conditional formatting value object.
4	numParam	8	The value of this conditional formatting value object. In NUM format.
12	fSaveGTE	4	=1 if the fGTE field is used
16	fGTE	4	For icon sets, determines whether this threshold value uses the greater than or equal to operator. =0 if 'greater than' is used =1 if 'greater than or equal to' is used.
20	cbFmla	4	The size of the FMLA
24	FMLA	FMLA	The value of this conditional formatting value object. This FMLA is written out only if cbFmla is greater than zero.

BRTMARGINS

Record 476, Size 48

This record describes the page margins for the worksheet.

Record data			
Offset	Field Name	Size	Contents
0	numLeft	8	Left Page Margin in inches. In NUM format.
8	numRight	8	Right Page Margin in inches. In NUM format.
16	numTop	8	Top Page Margin in inches. In NUM format.
24	numBottom	8	Bottom Page Margin in inches. In NUM format.
32	numHeader	8	Header Page Margin in inches. In NUM format.
40	numFooter	8	Footer Page Margin in inches. In NUM format.

BRTPRINTOPTIONS

Record 477, Size 2

Sheet printing options.

Record data**Offset Field Name Size Contents**

0	grbit1	2	See grbit1 description below.
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The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fHCenter	1	=1 if center on page horizontally when printing.
1	fVCenter	1	=1 if center on page vertically when printing.
2	fPrintHeaders	1	=1 if print row and column headings.
3	fPrintGrid	1	Used in conjunction with fPrintGridChanged. If both fPrintGrid and fPrintGridChanged =1, then grid lines shall print. Otherwise, they shall not (i.e., one or both have false values).
4	fGridLines	1	Used in conjunction with fPrintGrid. If both fPrintGrid and gridLines are true, then grid lines shall print. Otherwise, they shall not print.
5	unused	11	Reserved

BRTPAGESETUP

Record 478, Variable Size

Page setup settings for the worksheet.

Record data**Offset Field Name Size Contents**

0	iPaperSize	4	Paper size. See endnote. ⁱ
4	iScale	4	Print scaling. Valid values range from 10 to 400. This setting is overridden when iFitWidth and/or iFitHeight are in use.
8	iRes	4	Horizontal print resolution of the device.
12	iVRes	4	Vertical print resolution of the device.
16	iCopies	4	Number of copies to print.
20	iPageStart	4	Page number for first printed page.
24	iFitWidth	4	Number of horizontal pages to fit on.
28	iFitHeight	4	Number of vertical pages to fit on.
32	grbit1	2	See grbit1 description below.
34	strRelID	STR	Relationship Id of the devMode printer settings part.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fLeftToRight	1	=1 if print over, and then down.
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1	fLandscape	1	=0 if in Landscape mode =1 if in Portrait mode
2	fNoPls	1	=1, then the iPaperSize, iScale, iRes, iVRes, iCopies, and fLandscape data were not obtained from the printer, so they are not valid.
3	fNoColor	1	=1 if printing in black and white.
4	fDraft	1	=1 if printing without graphics.
5	fNotes	1	=1 if print notes.
6	fNoOrient	1	=1 if orientation not set.
7	fUsePage	1	=1 if use iPageStart for first page number, and do not auto-number the pages.
8	fEndNotes	1	=1 if print end notes (comments).
9	iErrors	2	Specifies how to print cell values for cells with errors. =0, display errors as on sheet =1, display errors as blank =2, display errors as --- (dashes) =3, display errors as #N/A
11	unused	5	Reserved

BRTWSFMTINFO

Record 485, Size 12

This record contains worksheet formatting properties.

Record data			
Offset	Field Name	Size	Contents
0	dxGCol	4	Default column width measured as the number of characters of the maximum digit width of the normal style's font.
4	cchDefColWidth	2	Specifies the number of characters of the maximum digit width of the normal style's font. This value does not include margin padding or extra padding for gridlines. It is only the number of characters.
6	miyDefRwHeight	2	Default row height measured in point size.
8	grbit1	2	See grbit1 description below.
10	iOutLevelRw	1	Highest number of outline level for rows in this sheet. These values must be in synch with the actual sheet outline levels.
11	iOutLevelCol	1	Highest number of outline levels for columns in this sheet. These values must be in synch with the actual sheet outline levels.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fUnsynced	1	=1 if the row height has been manually set.

1	fDyZero	1	=1 if rows are hidden by default. This setting is an optimization used when most rows of the sheet are hidden. In this case, instead of writing out every row and specifying hidden, it is much shorter to only write out the rows that are not hidden, and specify here that rows are hidden by default, and only not hidden if specified.
2	fExAsc	1	=1 if the row has a medium or thick top border, or if any cell in the row directly above the current row has a thick bottom border.
3	fExDesc	1	=1 if rows have a thick bottom border by default.
4	unused	12	Reserved

BRTHLINK

Record 494, Variable Size

A single hyperlink.

Record data

Offset	Field Name	Size	Contents
0	ref	16	REF cell location of hyperlink on worksheet.
P1	strRelId	STR	Relationship Id in this sheet's relationships part, expressing the target location of the resource.
P2	strLocation	STR	Location within target. If target is a workbook (or this workbook), this shall refer to a sheet and cell or a defined name. This can also be an HTML anchor if target is HTML file.
P3	strToolTip	STR	This is additional text to help the user understand more about the hyperlink. This can be displayed as hover text when the mouse is over the link, for example.
P4	strDisplay	STR	Display string, if different from string in string table.

BRTBEGINDCON

Record 495, Size 2

Marks the beginning of data consolidation information

Record data			
Offset	Field Name	Size	Contents
0	iiftab	1	Indicates which function to use when consolidating the ranges. 0= AVERAGE 1= COUNT 2= COUNTA 3= MAX 4= MIN 5= PRODUCT 6= STDEV 7= STDEVP 8= SUM 9= VAR 10= VARP
1	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLeftCat	1	=1 if use labels in left column. Both fLeftCat and fTopCat can be true at the same time.
1	fTopCat	1	=1 if use labels in top row. Both fLeftCat and fTopCat can be true at the same time.
2	fLinkConsol	1	=1 if create links to source data.
3	unused	5	Reserved

BRTENDDCON

Record 496, Size 0

Marks the end of data consolidation information

BRTBEGINDDREFS

Record 497, Size 4

Data consolidate reference collection.

Record data			
Offset	Field Name	Size	Contents
0	cdref	4	Count of data consolidate references.

BRTENDDREFS

Record 498, Size 0

The end of a data consolidate reference collection.

BRTDREF

Record 499, Variable Size

A single data consolidate reference. One dataRef shall use either name or sheet & ref, but not both on the same dataRef.

Record data

Offset	Field Name	Size	Contents
0	fName	4	=1 if the dataRef is using a name
4	fBuiltIn	4	=1 if the name is a built-in name
8	ref	16	Cell range in REF format.
P1	strName	STR	Named range, either in this workbook or the external workbook referenced by strRelId.
P2	strSheet	STR	Sheet name.
P3	strRelId	STR	Used only when the source range is external to this workbook.

BRTBEGINSCEMAN

Record 500, Variable Size

A collection of Scenarios. A scenario is a named what-if model that includes variable cells linked together by one or more formulas.

Record data

Offset	Field Name	Size	Contents
0	isctCur	2	Zero-based index to current scenario selected. Can correspond to selection UI.
2	isctShown	2	Zero-based index to last shown scenario. Indicates which scenario was last selected by the user to be run/shown.
4	sqref	SQREF	Range or sequence of cells used for scenario results summary.

BRTENDSCENMAN

Record 501, Size 0

The end of a collection of Scenarios.

BRTBEGINSCT

Record 502, Variable Size

An individual scenario description.

Record data

Offset	Field Name	Size	Contents
0	cref	2	Number of input cells.
2	fLocked	4	=1 if scenario is locked for editing when the sheet is protected. If sheet is protected and "edit scenarios" is enabled, then this setting is ignored.

6	fHidden	4	=1 if scenario is hidden when the sheet is protected and 'edit scenarios' is not enabled in sheet protection options. If the scenario is marked as hidden but sheet protection options specify to allow editing scenarios, then the scenario shall not be hidden.
P1	strName	STR	Scenario's name (user input). Must be unique for the workbook.
P2	strComment	STR	Comment for this scenario, rich text not supported.
P3	strNameUser	STR	Name of user who last changed the scenario.

BRTENDSCT

Record 503, Size 0

The end of an individual scenario description.

BRTSLC

Record 504, Variable Size

This collection that describes each input cell for the scenario.

Record data			
Offset	Field Name	Size	Contents
0	rw	4	Row reference indicating the input cell address.
4	col	4	Column reference indicating the input cell address.
8	fDeleted	4	=1 if input cell was deleted. This input cell shall be present in the file format, but shall not be presented to the user as part of the scenario inputs, nor run as part of the scenario.
12	fUndone	4	=1 if cell's deletion was undone. When =1 the r (reference) value shall not adjust in response to the cell moving due to row / column insert or delete, or cell move.
16	ifmt	2	This number format Id is used only when displaying the scenario manager input UI, and is used to properly format for display the cached input values for the scenario.
18	strVal	STR	Value that should be used for the cell when this scenario is run.

BRTPHONETICINFO

Record 537, Size 12

This record defines default phonetic information in the worksheet.

Record data			
Offset	Field Name	Size	Contents
0	ifnt	4	Zero-based index of the BRTFONT record saved in the STYLES part.

4	phtype	4	Character type 0= Half-width Katakana 1= Full-width Katakana 2= Hiragana 3= Any type of characters
8	phali	4	Text alignment 0= Any type of alignment 1= Left alignment 2= Center alignment 3= Distributed alignment

BRTDRAWING

Record 550, Variable Size

This record defines a drawing in the worksheet.

Record data

Offset Field Name Size Contents

0	strRelID	STR	Relationship Id referencing a part containing drawingML definitions for this worksheet.
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BRTLEGACYDRAWING

Record 551, Variable Size

This record is present when the sheet contains drawing shapes defined by VML. In this case, the record contains an explicit relationship whose ID points to the part containing the VML definitions.

Record data

Offset Field Name Size Contents

0	strRelID	STR	This value references a relationship Id for the sheet. The relationship shall point to the part containing the VML definition.
---	----------	-----	--

BRTLEGACYDRAWINGHF

Record 552, Variable Size

This record is present when the sheet contains drawing shapes defined by VML in the header / footer. In this case, the record contains an explicit relationship whose ID points to the part containing the VML definitions.

Record data

Offset Field Name Size Contents

0	strRelID	STR	This value references a relationship Id for the sheet. The relationship shall point to the part containing the VML definition.
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BRTEGINWEBPUBITEMS

Record 554, Size 4

This represents a listing of individual objects in this workbook that have been published (to HTML). Note that when one of these objects is selected to be published, just the object is published to HTML, not the entire workbook contents.

Record data

Offset	Field Name	Size	Contents
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0	cItems	4	Number of items.
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BRTENDWEBPUBITEMS

Record 555, Size 0

This represents the end of the listing of individual objects in this workbook that have been published.

BRTBEGINWEBPUBITEM

Record 556, VariableSize

This record defines a single Web publishing object for the workbook. This record tracks basic information about an object in the workbook, such as a named range, that is published to the Web.

Record data

Offset	Field Name	Size	Contents
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0	tws	1	Type of web source (or objects to publish). -1= Nil 0= Workbook 1= Sheet 2= PrintArea 3= AutoFilter 4= Reference 5= Chart 6= PivotTable 7= Query 8= Name
1	grbit1	4	See grbit1 description below.
5	nStyleId	4	Specifies the number, in "nnnnn" format, used in generated div id, in style id's, token filenames, and other variables.
9	ref	16	Source cell range, represented in REF form.
25	grbit2	1	See grbit2 description below.
P1	strBkmk	STR	Specifies the destination bookmark (div id) for the published object. This string is written out only if fIrstBkmk is true.
P2	strName	STR	Specifies the named range to be published. If omitted, the entire workbook is published. This string is written out only if fIrstName is true.
P3	strFile	STR	Specifies the destination file name to which the sourceObject will be published. This string is written out only if fIrstFile is true.
P4	strTitle	STR	Specifies the title of the published item. This string is written out only if fIrstTitle is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fNew	1	=1 if this item is not yet published
1	fAutoRepublish	1	=1 if the application will automatically publish the sourceObject when the workbook is saved.
2	unused	1	Reserved
3	fMhtml	1	=1 if publish in MHTML
4	unused	28	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fIrstBkmk	1	=1 if strBkmk publish in MHTML
1	fIrstName	1	=1 if strName is saved after the fixed size portion of the record.
2	fIrstFile	1	=1 if strFile is saved after the fixed size portion of the record.
3	fIrstTitle	1	=1 if strTitle is saved after the fixed size portion of the record.
4	unused	4	Reserved

BRTENDWEBPUBITEM

Record 557, Size 0

The end of a definition of a single Web publishing object for the workbook.

BRTBKHM

Record 562, Variable Size

This record defines a background bitmap.

Record data

Offset Field Name Size Contents

0	str	STR	This relationship Id is used to locate a particular image part.
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BRTBEGINVALS

Record 573, Size 18

This collection expresses all data validation information for cells in a sheet which have data validation features applied. Data validation is used to specify constraints on the type of data that can be entered into a cell. Additional UI can be provided to help the user select valid values (e.g., a dropdown control on the cell or hover text when the cell is active), and to help the user understand why a particular entry was considered invalid (e.g., alerts and messages). Various data types can be selected, and logical operators (e.g., greater than,

less than, equal to, etc) can be used. Additionally, instead of specifying an explicit set of values that are valid, a cell or range reference may be used. An input message can be specified to help the user know what kind of value is expected, and a warning message (and warning type) can be specified to alert the user when they've entered invalid data.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	xLeft	4	The x-coordinate (relative to window) of top-left corner of the data validation input prompt (textbox). This is per sheet, not per cell. Units in pixels.
6	yTop	4	The y-coordinate (relative to window) of top-left corner of the data validation input prompt (textbox). This is per sheet, not per cell. Units in pixels.
10	unused	4	Reserved
14	idvMac	4	The expected number of data validation items for this worksheet.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fWnClosed	1	=1 if all input prompts for the worksheet are disabled.
1	unused	15	Reserved

BRTENDDVALS

Record 574, Size 0

The end of a collection that expresses all data validation information for cells in a sheet which have data validation features applied.

BRTCELLSMARTTAGPROPERTY

Record 589, Variable Size

Represents a single property of a smart tag in a cell; contains a key-value pair.

Record data

Offset Field Name Size Contents

P1	strKey	STR	Key name of a single property of a smart tag in a cell.
P2	strVal	STR	String value of a single property of a smart tag in a cell.

BRTBEGINCELLSMARTTAG

Record 590, Size 6

Single smart tag associated with a cell.

Record data			
Offset	Field Name	Size	Contents
0	ifacttype	4	Book-level zero-based index of the smart tag type. This index references a BRTSMARTTAGTYPE record in the workbook part.
4	grbit1	2	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fXMLBased	1	=0 if using the more usual cell-content-based recognition type of smart tags. =1 if the Smart Tag recognition is triggered because the cell is associated with an XML map (schema-based semantic recognition)
1	fDeleted	1	=1 if that the application shouldn't display a particular smart tag in the cell, for example, when the user has chosen to explicitly remove the Smart Tag by interacting with the application's user interface.
2	unused	14	Reserved

BRTENDCELLSMARTTAG

Record 591, Size 0

The end of a single smart tag associated with a cell.

BRTBEGINCELLSMARTTAGS

Record 592, Size 8

The record is used to label the cell with a smart tag. A cell may be determined to have semantic meaning and the cell containing this data can be labeled with a smart tag. The types of actions you can take depend on the semantic meaning of the data and the actions that the application decides to associate with that type of smart tag.

Record data			
Offset	Field Name	Size	Contents
0	rw	4	Row reference to the cell that contains this set of smart tags.
4	col	4	Column reference to the cell that contains this set of smart tags.

BRTENDCELLSMARTTAGS

Record 593, Size 0

The end of a label used to label the cell with a smart tag.

BRTBEGINSMARTTAGS

Record 594, Size 0

This collection expresses all smart tags associated with cells on this sheet. There can be multiple smart tags associated with a particular cell, and many cells with smart tags for a given worksheet.

BRTENDSMARTTAGS

Record 595, Size 0

The end of a collection expressing all smart tags associated with cells on this sheet.

BRTBEGINCELLWATCHES

Record 605, Size 0

Collection of cells on this worksheet being watched in the 'watch window'.

BRTENDCELLWATCHES

Record 606, Size 0

The end of a collection of cells on this worksheet being watched in the 'watch window'.

BRTCELLWATCH

Record 607, Size 8

The watch window is a single UI location where the application user can keep track of certain cell formulas & values which they have chosen to be in the set of watched cells. This record expresses the cell address of a cell being watched. It is always a reference to a single cell.

Record data

Offset	Field Name	Size	Contents
0	rw	4	Row reference of the cell being watched.
4	col	4	Column reference of the cell being watched.

BRTBIGNAME

Record 625, Variable Size

This record provides a mechanism to store name/value pairs of arbitrary user-defined data.

Record data

Offset	Field Name	Size	Contents
P1	strName	STR	Name of the custom property
P2	strRelId	STR	This relationship references the binary part containing the specified custom properties.

BRTBEGINOLEOBJECTS

Record 638, Size 0

The beginning of the collection storing information about embedded objects.

BRTOLEOBJECT

Record 639, Variable Size

Information for an individual embedded object.

Record data			
Offset	Field Name	Size	Contents
0	dwAspect	4	Specifies the desired Data or View Aspect of the object when drawing or getting data
4	dwOleUpdate	4	Indicates whether the linked object updates the cached data automatically or only when the container requests an update, only present if the embedded object is linked.
8	spid	4	Id of the shape this object is associated with.
12	grbit1	2	See grbit1 description below.
P1	strProgID	80	Null terminated string representing the progId of the embedded object.
P2	FMLA	FMLA	The embedded object's link moniker. This FMLA is only written if fLinked in grbit1 is false.
P2	strRelID	STR	Relationship Id of the relationship pointing to the object persistence part. This string is only written if fLinked in grbit1 is false.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLinked	1	=1 if the OLE object is linked via an OLE link (usually through Paste Special, paste as link)
1	fAutoLoad	1	=1 if the host application for the embedded object shall be called to load the object data automatically when the parent workbook is opened.
2	unused	14	Reserved

BRTENDOLEOBJECTS

Record 640, Size 0

The end of the collection storing information about embedded objects.

BRTBEGINACTIVEXCONTROLS

Record 643, Size 0

Worksheets can have embedded controls embedded in them. This collection is a listing of embedded controls in this worksheet. This collection is used to reference individual Embedded Control Data part definitions, enumerate the code name of each control, and reference drawing information used to draw the control.

BRTACTIVEX

Record 644, Variable Size

A single embedded control.

Record data			
Offset	Field Name	Size	Contents
0	spid	4	ID of the drawing shape in the Legacy Drawing part with which this control is associated. The drawing is used to draw the control in the sheet.
P1	strRelID	STR	This relationship ID references an Embedded Control Data part which contains control-specific properties and state information about this particular embedded control.
P2	strName	STR	The code name of the control.

BRTENDACTIVECONTROLS

Record 645, Size 0

This is the end of a collection of embedded controls in this worksheet.

BRTBEGINCELLIGNOREECS

Record 648, Size 0

A collection of ignored errors, by cell range.

BRTCELLIGNOREEC

Record 649, Variable Size

A single ignored error type for a range of cells.

A cell is considered to have an error condition when it meets one of the conditions specified in the field descriptions below. For example, if a cell is formatted as text but contains a numeric value, this is considered to be a potential error because the number won't be treated as a number, for example, in calculations.

Note that this is simply a guess by the implementing application, and a recommendation to the user. Cells with the errors specified below may have perfectly valid reasons for being in such a state, for example a cell formatted as text which contains numeric Postal Codes or Order numbers. It is useful to format these cells as text so that leading zeros remain as part of the value instead of being removed.

This record is written if the user has specifically reviewed the error and decided to keep the cell state as it is, and no longer wishes to be alerted about it for this cell. This can be helpful for the application to decide which errors should be surfaced to the user vs kept quiet because the user doesn't want these to be surfaced (e.g., because they are legitimate cell states).

Note: more than one kind of error can exist on a cell. These flags are not mutually exclusive.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	sqref	SQREF	Reference to a range of cells that have this ignored error.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	ffecCalcError	1	=1 if errors ignored when cells contain formulas that result in an error.
1	ffecEmptyCellRef	1	=1 if errors ignored when formulas refer to empty cells.
2	ffecNumStoredAsText	1	=1 if errors ignored when numbers are formatted as text or are preceded by an apostrophe.
3	ffecInconsistRange	1	=1 if errors ignored when formulas omit certain cells in a region.
4	ffecInconsistFmla	1	=1 if errors ignored when a formula in a region of your worksheet differs from other formulas in the same region.
5	ffecTextDateInsuff	1	=1 if errors ignored when formulas contain text formatted cells with years represented as 2 digits.
6	ffecUnprotFmla	1	=1 if errors ignored when unlocked cells contain formulas.
7	ffecDataValidation	1	=1 if errors ignored when a cell's value in a Table does not comply with the Data Validation rules specified.
8	ffecCalcCol	1	=1 if errors ignored when cells contain a value different from a calculated column formula. In other words, for a calculated column, a cell in that column is considered to have an error if its formula is different from the calculated column formula, or doesn't contain a formula at all.
9	unused	23	Reserved

BRTENDCELLIGNOREECS

Record 650, Size 0

The end of a collection of ignored errors, by cell range.

BRTBEGINTABLEPARTS

Record 660, Size 4

This collection expresses a relationship Id pointing to every table on this sheet.

Record data			
Offset	Field Name	Size	Contents
0	cParts	4	A count of table records in the collection.

BRTTABLEPART

Record 661, Variable Size

A single Table Part reference.

Record data**Offset Field Name Size Contents**

0	strRelID	STR	This relationship Id is used to locate a particular table definition part.
---	----------	-----	--

BRTENDTABLEPARTS

Record 662, Size 0

The end of a collection expressing a relationship Id pointing to every table on this sheet.

BRTSHEETCALCPROP

Record 663, Size 1

This record contains calculation properties for the worksheet.

Record data**Offset Field Name Size Contents**

0	grbit1	1	See grbit1 description below.
---	--------	---	-------------------------------

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fFullCalc OnLoad	1	=1 if the application should do a full calculate on load due to contents on this sheet. After load and successful calc, the application shall set this value to 0. Set this to 1 when the application should calculate the workbook on load.
1	unused	7	Reserved

ChartSheet Part

Sheets are the central structures within a workbook, and are where the user does most of their spreadsheet work. Chartsheets contain a single chart, with the additional view, page setup, and publishing functionality of a sheet.

RECORD ORDER

```
brtBeginSheet [Record 161]
    brtCsProp [Record 651] (occurs 0 to 1 times)
    brtBeginCsViews [Record 139]
        brtBeginCsView [Record 141] (occurs 1 or more times)
        brtEndCsView [Record 142]
    brtEndCsViews [Record 140]
    brtCsProtection [Record 669] (occurs 0 to 1 times)
    brtBeginUserCsViews [Record 653] (occurs 0 to 1 times)
        brtBeginUserCsView [Record 655] (occurs 0 or more times)
            brtMargins [Record 476] (occurs 0 to 1 times)
            brtCsPageSetup [Record 652] (occurs 0 to 1 times)
            <Header/Footer Records> (occurs 0 to 1 times)
        brtEndUserCsView [Record 656]
    brtEndUserCsViews [Record 654]
    brtMargins [Record 476] (occurs 0 to 1 times)
    brtCsPageSetup [Record 652] (occurs 0 to 1 times)
    <Header/Footer Records> (occurs 0 to 1 times)
    brtDrawing [Record 550]
        brtLegacyDrawing [Record 551] (occurs 0 to 1 times)
        brtLegacyDrawingHF [Record 552] (occurs 0 to 1 times)
        brtBkhim [Record 562] (occurs 0 to 1 times)
    brtBeginWebPubItems [Record 554] (occurs 0 to 1 times)
        brtBeginWebPubItem [Record 556] (occurs 1 or more times)
        brtEndWebPubItem [Record 557]
    brtEndWebPubItems [Record 555]
brtEndSheet [Record 162]
```

BRTBEGINCSVIEWS

Record 139, Size 0

This record specifies a collection of chart sheet views.

BRTENDCSVIEWS

Record 140, Size 0

This record specifies the end of a collection of chart sheet views.

BRTBEGINCSVIEW

Record 141, Size 10

This record specifies a chart sheet view.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit description below.
2	wScale	4	Window zoom magnification, representing percent values. Valid values range from 10 to 400. Horizontal & Vertical scale together.
6	iwbkview	4	Index of this workbook view, pointing to a workbookView record in the bookViews collection.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
--------	------------	------	----------

Offset	Field Name	Bits	Contents
0	fSelected	1	=1 if the sheet tab is selected.
1	fZoomToFit	1	=1 if the chart sheet is zoomed to fit window.
2	unused	14	Reserved

BRTENDCSVIEW

Record 142, Size 0

This record specifies the end of a chart sheet view.

BRTMARGINS

Record 476, Size 48

This record describes the page margins for the chartsheet.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

Offset	Field Name	Size	Contents
0	numLeft	8	Left Page Margin in inches. Represented in NUM format.
8	numRight	8	Right Page Margin in inches. Represented in NUM format.
16	numTop	8	Top Page Margin in inches. Represented in NUM format.
24	numBottom	8	Bottom Page Margin in inches. Represented in NUM format.

32	numHeader	8	Header Page Margin in inches. Represented in NUM format.
40	numFooter	8	Footer Page Margin in inches. Represented in NUM format.

BRTDRAWING

Record 550, Variable Size

This record defines a drawing in the chart sheet.

Record data

Offset Field Name Size Contents

0	strRelID	STR	Relationship Id referencing a part containing drawing definitions for this worksheet.
---	----------	-----	---

BRTELEGACYDRAWING

Record 551, Variable Size

This record is present when the sheet contains drawing shapes defined by VML. In this case, the record contains an explicit relationship whose ID points to the part containing the VML definitions.

Record data

Offset Field Name Size Contents

0	strRelID	STR	This value references a relationship Id for the sheet. The relationship shall point to the part containing the VML definition.
---	----------	-----	--

BRTELEGACYDRAWINGHF

Record 552, Variable Size

This record is present when the sheet contains drawing shapes defined by VML in the header / footer. In this case, the record contains an explicit relationship whose ID points to the part containing the VML definitions.

Record data

Offset Field Name Size Contents

0	strRelId	STR	This value references a relationship Id for the sheet. The relationship shall point to the part containing the VML definition.
---	----------	-----	--

BRTBEGINWEBPUBITEMS

Record 554, Size 4

This represents a listing of individual objects in this workbook that have been published (to HTML). Note that when one of these objects is selected to be published, just the object is published to HTML, not the entire workbook contents.

Record data			
Offset	Field Name	Size	Contents
0	cItems	4	Number of items.

BRTENDWEBPUBITEMS

Record 555, Size 0

This represents the end of the listing of individual objects in this workbook that have been published.

BRTBEGINWEBPUBITEM

Record 556, VariableSize

This record defines a single Web publishing object for the workbook. This record tracks basic information about an object in the workbook, such as a named range, that is published to the Web.

Record data			
Offset	Field Name	Size	Contents
0	tws	1	Type of web source (or objects to publish). -1= Nil 0= Workbook 1= Sheet 2= PrintArea 3= AutoFilter 4= Reference 5= Chart 6= PivotTable 7= Query 8= Name
1	grbit1	4	See grbit1 description below.
5	nStyleId	4	Specifies the number, in "nnnnn" format, used in generated div id, in style id's, token filenames, and other variables.
9	ref	16	Source cell range, represented in REF format.
25	grbit2	1	See grbit2 description below.
P1	strBkmk	STR	Specifies the destination bookmark (div id) for the published object. This string is written out only if it isn't null.
P2	strName	STR	Specifies the named range to be published. If omitted, the entire workbook is published. This string is written out only if it isn't null.
P3	strFile	STR	Specifies the destination file name to which the tws will be published. This string is written out only if it isn't null.
P4	strTitle	STR	Specifies the title of the published item. This string is written out only if it isn't null.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fNew	1	=1 if this item is not yet published
1	fAutoRepublish	1	=1 if the application will automatically publish the tws when the workbook is saved.
2	unused	1	Reserved
3	fMhtml	1	=1 if is published in MHTML
4	unused	28	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fIrstBkmk	1	=1 if strBkmk is published in MHTML
1	fIrstName	1	=1 if strName is saved after the fixed size portion of the record.
2	fIrstFile	1	=1 if strFile is saved after the fixed size portion of the record.
3	fIrstTitle	1	=1 if strTitle is saved after the fixed size portion of the record.
4	unused	4	Reserved

BRTENDWEBPUBITEM

Record 557, Size 0

The end of a definition of a single Web publishing object for the workbook.

BRTBKHM

Record 562, Variable Size

This record defines a background bitmap.

Record data

Offset	Field Name	Size	Contents
0	str	STR	This relationship Id is used to locate a particular table definition part.

BRTCSPROP

Record 651, Variable Size

This record specifies chart sheet properties.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	brtColorTab	8	The color of the chartsheet's tab. See description of BRTCOLOR in the STYLES part.

10	strCodeName	STR	Specifies a stable name of the sheet, which should not change over time, and does not change from user input. This name should be used by code to reference a particular sheet.
----	-------------	-----	---

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fPublished	1	=1 if table is marked as published for viewing by a server based spreadsheet application. [Note: Such an application might only display objects from the workbook that are marked as published, thus being able to load and calculate the entire workbook but only show the specific items that are marked as published. This can allow the server spreadsheet rendering to provide a more restricted view of the workbook.]
1	unused	15	Reserved

BRTCSPAGESETUP

Record 652, Variable Size

This record provides page setup properties for chart sheets.

Record data

Offset	Field Name	Size	Contents
0	iPaperSize	4	Specifies the paper size. See BRTPAGESETUP for more information.
4	iRes	4	Horizontal print resolution of the device.
8	iVRes	4	Vertical print resolution of the device.
12	iCopies	4	Number of copies to print.
16	iPageStart	2	Page number for first printed page.
18	grbit1	2	See grbit1 description below.
20	strRelID	STR	Relationship Id of the devMode printer settings part.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLandscape	1	=1 if orientation of the page is set to landscape. =0 if orientation of the page is set to portrait.
1	fNoPls	1	=1 if printer's defaults settings not are used for page setup values.
2	fNoColor	1	=1 if print in black and white.
3	fNoOrient	1	=1 if orientation of the page has not been set by the printer.
4	fUsePage	1	=1 if should use firstPageNumber value for first page number, and not auto number the pages.
5	fDraft	1	=1 if draft quality.
6	unused	10	Reserved

BRTBEGINUSERCSVIEWS

Record 653, Size 0

This record specifies a collection of custom Chart Sheet View information.

BRTENDUSERCSVIEWS

Record 654, Size 0

This record specifies the end of a collection of custom Chart Sheet View information.

BRTBEGINUSERCSVIEW

Record 655, Size 28

This record defines custom view properties for chart sheets.

Record data

Offset	Field Name	Size	Contents
0	guid	16	Unique identifier of this custom view
16	itabid	4	Specifies the internal identifier for the sheet. This identifier must be unique.
20	dwScale	4	Print scaling, representing percent values. Valid values range from 10 to 400. Horizontal & Vertical scale together.
24	grbit1	4	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	hsState	2	Visibility state of the sheet. =0 if visibility state set to visible. =1 if visibility state set to hidden. =2 if visibility state set to very hidden (VBA only).
2	fZoomToFit	1	=1 if the chart sheet is zoom to fitwindow.
3	unused	29	Reserved

BRTENDUSERCSVIEW

Record 656, Size 0

This record specifies the end of custom view properties for chart sheets.

Sheet Index Part

The index stream contains 3 types of records: `brtIndexBlock` [Record 42], `brtIndexRowBlock` [Record 40], and `brtIndexPartEnd` [Record 277]. The record stream is structured as repeating sequences of `brtIndexBlock`, `brtIndexRowBlock`.

This part helps Excel 2007 to locate cells within a sheet quickly and efficiently when looking up formula reference values in external workbooks.

BRTINDEXROWBLOCK

Record 42, Variable Size

The `brtIndexRowBlock` contains up to 32 subsequent row column indexes. Each row is broken up into 16 column blocks – each block is 1024 cells. The record contains indexes to the first used cell in each block. This enables Excel to quickly jump to any block that a desired cell is in. Excel jumps to the right block and then examines the following records for the desired cell.

To enable the `brtIndexRowBlock` to be sparse it doesn't store 32x16 QWORDS, it stores header information. The header describes what rows are in use; Excel only stores indexes to used column blocks.

Record data			
Offset	Field Name	Size	Contents
0	<code>grbitRowMask</code>	4	Indicates what rows are in use by checking what bits are set; each used row is indicated by setting its corresponding bit to 1. For example, if rows 2 & 5 are used then <code>grbitRowMask</code> = $2^4 + 2^1 = 17$.
4	<code>ibBase</code>	8	Base row/column offset used with <code>rgdwib</code>
P1	<code>rggrbitColMask</code>	RG 2	Array of column masks; there is one column mask <code>grbit</code> per used row. Each bit of the <code>grbitColMask</code> indicates which column blocks are in use. For example, if the first & last cells are used, then the <code>grbitColMask</code> is $2^0 + 2^{15} = 32769$. The size of this array is not written out; instead we rely on the count of the rows used in the <code>grbitRowMask</code> .
P2	<code>rgdwib</code>	RG 4	There is a four byte <code>dwb</code> per used column block. The <code>dwb</code> is added to the <code>ibBase</code> , resulting in the first cell in that column block. The actual column that cell is on is stored with the cell itself. The size of this array is not written out; instead we rely on the total count of all the bits set in <code>rggrbitColMask</code> .

BRTINDEXBLOCK

Record 40, Size 20

The `brtIndexBlock` stores the range of rows that a `brtIndexRowBlock` indexes.

Record data			
Offset	Field Name	Size	Contents
0	<code>rwMic</code>	4	The first row that is described by the following <code>BRTINDEXROWBLOCK</code> record.
4	<code>rwMac</code>	4	The last row +1 that is described by the following <code>BRTINDEXROWBLOCK</code> record. <code>rwMic</code> and <code>rwMac</code> are never more than 32 rows apart and each <code>BRTINDEXBLOCK</code> record contains sequential rows. This allows the index stream to be row sparse.
8	<code>ibNextIndex Block</code>	12	Reserved

BRTINDEXPARTEND

Record 277, Size 0

Marks the end of the index part.

Book Part

The book part defines the structure of the workbook:

- *Sheets*: The collection of worksheets in the workbook. The worksheet is the primary document that you use to store and work with data.
- *Views*: Workbook views define basic window dimensions and position of the workbook. Custom workbook views allow the end-user to define a series of rich views on their workbook data. Users can create more than one view of the same workbook without saving separate copies of the workbook.
- *Properties*: The workbook has several property collections that store basic workbook settings, such as the date system to use, file protection settings, calculation settings, and smart tag behaviors.
- *Names*: Names are descriptive text that represents cells, ranges of cells, formulas, or constant values.

RECORD ORDER

`brtBeginBook [Record 131]`

`brtFileVersion [Record 128] (occurs 0 to 1 times)`
`brtFileSharing [Record 548] (occurs 0 to 1 times)`
`brtWbProp [Record 153] (occurs 0 to 1 times)`
`brtBookProtection [Record 534] (occurs 0 to 1 times)`
`brtBeginBookViews [Record 135] (occurs 0 to 1 times)`
`brtBookView [Record 158] (occurs 1 or more times)`

`brtEndBookViews [Record 136]`

`brtBeginBundleShs [Record 143]`
`brtBundleSh [Record 156] (occurs 1 or more times)`
`brtEndBundleShs [Record 144]`
`brtBeginFnGroup [Record 664] (occurs 0 to 1 times)`
`brtFnGroup [Record 665] (occurs 0 or more times)`
`brtEndFnGroup [Record 666]`
`brtBeginExternals [Record 353] (occurs 0 to 1 times)`

One or more of the following

`brtSupSelf [Record 357]`
`brtSupSame [Record 358]`
`brtSupAddin [Record 667]`
`brtSupBookSrc [Record 355]`

If `brtSame` or `brtAddin` is used, then also:

`brtPlaceholderName [Record 361] (occurs 1 or more times)`

```
    brtExternSheet [Record 362]
    brtEndExternals [Record 354]
    brtName [Record 39] (occurs 0 or more times)
    brtCalcProp [Record 157] (occurs 0 to 1 times)
    brtOleSize [Record 549] (occurs 0 to 1 times)
    brtUserBookView [Record 397] (occurs 0 or more times)
    brtBeginPivotCacheIDs [Record 384] (occurs 0 to 1 times)
        brtBeginPivotCacheID [Record 386] (occurs 1 or more times)
        brtEndPivotCacheID [Record 387]
    brtEndPivotCacheIDs [Record 385]
    brtWbFactoid [Record 154] (occurs 0 to 1 times)
    brtBeginSmartTagTypes [Record 597] (occurs 0 to 1 times)
        brtSmartTagType [Record 596] (occurs 0 or more times)
    brtEndSmartTagTypes [Record 598]
    brtWebOpt [Record 553] (occurs 0 to 1 times)
    brtFileRecover [Record 155] (occurs 0 or more times)
    brtBeginWebPubItems [Record 554] (occurs 0 or more times)
        brtBeginWebPubItem [Record 556] (occurs 1 or more times)
        brtEndWebPubItem [Record 557] (occurs 1 or more times)
    brtEndWebPubItems [Record 555]
    brtBeginCERerrs [Record 608] (occurs 0 or 1 times)
        brtCrashRecErr [Record 610] (occurs 0 or more times)
    brtEndCERerrs [Record 609]
brtEndBook [Record 132]
```

BRTNAME

Record 39, Variable Size

This record defines the defined names that are within this workbook. Defined names are descriptive text that is used to represents a cell, range of cells, formula, or constant value. Use easy-to-understand names, such as Products, to refer to hard to understand ranges, such as Sales!C20:C30.

A defined name in a formula can make it easier to understand the purpose of the formula. For example, the formula =SUM(FirstQuarterSales) might be easier to identify than =SUM(C20:C30).

Names are available to any sheet. For example, if the name ProjectedSales refers to the range A20:A30 on the first worksheet in a workbook, you can use the name ProjectedSales on any other sheet in the same workbook to refer to range A20:A30 on the first worksheet.

Names can also be used to represent formulas or values that do not change (constants). For example, you can use the name SalesTax to represent the sales tax amount (such as 6.2 percent) applied to sales transactions.

You can also link to a defined name in another workbook, or define a name that refers to cells in another workbook. For example, the formula =SUM(Sales.xls!ProjectedSales) refers to the named range ProjectedSales in the workbook named Sales.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	chKey	1	Specifies the keyboard shortcut for the defined name.
5	itab	4	Specifies the sheet index in this workbook where data from an external reference is displayed.
P1	str	STR	Specifies the name that will appear in the user interface for the defined name. See endnote for predefined names. ⁱⁱ
P2	FMLA	FMLA	The FMLA associated with the defined name
P3	strComment	STR	Specifies the comment the user provided when the name was created.
P4	strCustommenu	STR	Specifies custom menu text for the defined name. This string is written out only if fProc in grbit1 is true and fOB in grbit1 if false.
P5	strDescription	STR	Specifies description text for the defined name. This string is written out only if fProc in grbit1 is true and fOB in grbit1 if false.
P6	strHelptopic	STR	Specifies the help topic to display for this defined name. This string is written out only if fProc in grbit1 is true and fOB in grbit1 if false.
P7	strStatustext	STR	Specifies text that is displayed on the application status bar when the user places focus on the defined name. This string is written out only if fProc in grbit1 is true and fOB in grbit1 if false.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fHidden	1	=1 if the defined name is hidden in the user interface.
1	fFunc	1	=1 if the defined name refers to a user-defined function. This attribute is used when there is an add-in or other code project associated with the file.
2	fOB	1	=1 if the name is a Visual Basic procedure.
3	fProc	1	=1 if the name is a function or a command name on a macro sheet.

4	fCalcExp	1	=1 if the name contains a complex function.
5	fBuiltIn	1	=1 if the name is a built in name
6	fgrp	9	Specifies the function group index if the defined name refers to a function. The function group defines the general category for the function. This attribute is used when there is an add-in or other code project associated with the file. =1 for category: Financial =2 for category: Date and Time =3 for category: Math and Trig =4 for category: Statistical =5 for category: Lookup and Reference =6 for category: Database =7 for category: Text =8 for category: Logical =9 for category: Information =10 for category: Commands =11 for category: Customizing =12 for category: Macro Control =13 for category: DDE / External =14 for category: User Defined =15 for category: Engineering =16 for category: Cube
15	fPublished	1	=1 if the defined name is included in the version of the workbook that is published to or rendered on a Web or application server.
16	fWorkbookParam	1	=1 if the name is used as a workbook parameter on a version of the workbook that is published to or rendered on a Web or application server.
17	unused	15	Reserved

BRTFILEVERSION

Record 128, Variable Size

This record defines properties that track which version of the application accessed the data and source code contained in the file.

Record data			
Offset	Field Name	Size	Contents
0	guidTypelib	16	Specifies the GUID that identifies the code project that is associated with the workbook. Note: The primary use of this attribute is to track the version of the compiled code.

P1	strAppName	STR	Specifies the application name. When saving, applications can write their strAppName value and optionally write strLastEdited and strLowestEdited attributes to track the version of the application that performed those actions. When opening the workbook, applications can examine the value of strAppName and decide how to interpret strLastEdited, strLowestEdited, and strRupBuild attributes.
P2	strLastEdited	STR	Specifies the version of the application that last saved the workbook. This attribute is application-dependent.
P3	strLowestEdited	STR	Specifies the earliest version of the application that saved the workbook. This value is reset any time an application that can read all data in the file saves the file. This attribute is application-dependent.
P4	strRupBuild	STR	Specifies the incremental public release of the application. For example, betas, service packs, and versions.

BRTBEGINBOOK

Record 131, Size 0

This record marks the beginning of the root part of the workbook.

BRTENDBOOK

Record 132, Size 0

This record is the end of the root part of the workbook.

BRTBEGINBOOKVIEWS

Record 135, Size 0

This record specifies the collection of workbook views. Each view can specify a window position, filter options, and other configurations. There is no limit on the number of views that can be defined for a workbook.

BRTENDBOOKVIEWS

Record 136, Size 0

This record specifies the end of the collection of workbook views.

BRTBEGINBUNDLESHS

Record 143, Size 0

This record represents the collection of sheets in the workbook. There are different types of sheets you can create. The most common sheet type is a worksheet; also called a spreadsheet. A worksheet is the primary document that you use in to store and work with data. A worksheet consists of cells that are organized into columns and rows.

Some workbooks might have a modular design where there is one sheet for data and another worksheet for each type of analysis. In a complex modular system, you might have dozens of sheets, each dedicated to a specific task.

BRTEENDBUNDLESHS

Record 144, Size 0

This record represents the end of the collection of sheets in the workbook.

BRTWBPROP

Record 153, Variable Size

This record defines a collection of workbook properties.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	dwThemeVersion	4	Specifies the default version of themes to apply in the workbook.
8	strCodeName	STR	Specifies the codename of the application that created this workbook. Use this to track file content in incremental releases of the application.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	f1904	1	=1 if the date system starts in 1904. =0 if the workbook uses the 1900 date system, where 1/1/1900 is the first day in the system.
1	unused	1	Reserved
2	fHideBorderUnselLists	1	=1 if borders are hidden around unselected tables.
3	fFilterPrivacy	1	=1 if the application has been inspected the workbook for personally identifying information (PII). The application warns the user any time the user performs an action that will insert PII into the document. For example, inserting a comment might insert the user's name, and so this action will trigger a warning if this flag is set.
4	fBuggedUserAboutSolution	1	=1 if the user received an alert to load SmartDoc.
5	fShowInkAnnotation	1	=1 if ink annotations are shown in the workbook.
6	fBackup	1	=1 if the application creates a backup of the workbook on save.

7	grbitUpdateLinks	2	Specifies how the application updates external links when the workbook is opened. =0 if the user can choose to display the alert or not. Corresponds to tools/options setting, "Ask to update automatic links. =1 if the alert is not displayed and links are not automatically updated. =2 if the alert is not displayed and links are automatically updated.
9	fNoSaveSup	1	=1 if data from externally linked formulas is not cached (at save). A supporting part is written out containing a cached cell table from the external workbook if =0.
10	fHidePivotTableFList	1	=1 if a list of fields is shown for pivot tables in the application user interface.
11	fPublishedBookItems	1	=1 workbook items are published to the application server.
12	fCheckCompat	1	=1 if the application performs a compatibility check when saving to legacy binary formats.
13	mdDspObj	2	=0 if the application shows all embedded objects =1 if the application shows placeholders =2 if the application hides all embedded objects
15	fShowPivotChartFilter	1	=1 if filtering options shall be shown for pivot charts.
16	fAutoCompressPictures	1	=1 if the application automatically compresses pictures of the workbook. When a picture is compressed, the application reduces resolution (to 96 dots per inch (dpi) for Web and 200 dpi for print), discards extra information (for example, when a picture has been cropped or resized, the "hidden" parts of the picture are stored in the file), and compresses the picture, if possible.
17	fRefreshAll	1	=1 if the workbook refreshes all the connections to data sources during load.
18	unused	14	Reserved

BRTWBFACOID

Record 154, Size 1

This record defines a collection of smart tag properties that determine smart tag behavior in the workbook.

Record data

Offset Field Name Size Contents

0	grbit1	1	See grbit1 description below.
---	--------	---	-------------------------------

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fEmbedFactoids	1	=1 if the application saves smart tags with the workbook. Smart tag information is saved both in the workbook part and the sheet parts.
1	mdFactoidDisplay	2	=0 if smart tags are displayed =1 if smart tags are not displayed =2 if smart tag indicators are not displayed
3	unused	5	Reserved

BRTFILERECOVER

Record 155, Size 1

This record defines properties that track the state of the workbook file, such as whether the file was saved during a crash, or whether it should be opened in auto-recover mode.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDontAutoRecover	1	=1 if the file is not marked for auto-recovery.
1	fSavedDuringRecovery	1	=1 if the workbook was last saved after a crash.
2	fCreatedViaMinimalSave	1	=1 if the file is saved under minimal save file mode, which means that the file was stripped of all non essential data, leaving cell data, formulas, fonts, and formatting.
3	fOpenedViaDataRecovery	1	=1 if the workbook was last opened for data recovery.
4	fOpenedViaSafeLoad	1	=1 if the workbook was last opened in safe or repair mode.
5	unused	3	Reserved

BRTBUNDLESH

Record 156, Variable Size

This record defines a sheet in this workbook. Sheet data is stored in a separate part.

Record data

Offset	Field Name	Size	Contents
0	hsState	4	Visibility state of the sheet. =0 if the sheet is visible =1 if the sheet is hidden =2 if the sheet is very hidden (VBA only)

4	itabid	4	Specifies the internal identifier for the sheet. This identifier must be unique.
P1	strRelID	STR	The relationship id pointing to the sheet's associated part within the file container.
P2	strName	STR	Specifies the name of the sheet. This name must be unique.

BRTCALCPROP

Record 157, Size 26

This record defines the collection of properties that the application uses to record calculation status and details. Calculation is the process of computing formulas and then displaying the results as values in the cells that contain the formulas.

Record data

Offset Field Name Size Contents

0	recalcID	4	Specifies the version of the calculation engine used to calculate values in the workbook. When you open a workbook created in the current version, the application recalculates only the formulas that depend on cells that have changed. When you use open a workbook that was created in a earlier version of the application, all the formulas in the workbook, those that depend on cells that have changed and those that do not, are recalculated. This ensures that the workbook is fully optimized for the current application version.
			The value for calcID depends on the application. RecalcId has the form [version][build], where [version] refers to the version of the application, and [build] refers to the build of the application when the calculation engine changed.
4	fAutoRecalc	4	Calculation mode: =0 for manual =1 for automatic =-1 for automatic, except tables
8	cCalcCount	4	Specifies the number of iterations the calculation engine will attempt when calculating a workbook with circular references, when iterate is true.
12	numDelta	8	Specifies a double that contains the maximum change for iterative calculations. The application stops calculating after cCalcCount iterations or after all values in the circular reference change by less than numDelta between iterations, whichever comes first. in NUM format.
20	cUserThread Count	4	Specifies the count of concurrent calculation processes manually set by the user.
24	grbit1	1	See grbit1 description below.
25	grbit2	1	See grbit2 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fFullCalcOnLoad	1	=1 if the application should do a full calculate on load due to contents on this sheet (after load and successful calc, the application will set this value to 0).
1	fRefA1	1	=1 if the reference style for the workbook is A1. Instead of using letters for columns and numbers for rows ("A1"), this option can enable using numbers for both rows and columns. Cells are then referred to in this format: R1C1.
2	fIter	1	=1 if the application should attempt to calculate formulas that contain circular references. A circular reference is a formula that refers to the cell either directly or indirectly that contains the formula. If a formula refers back to one of its own cells, you must determine how many times the formula should recalculate. The calculation engine will perform iterative cCalcCount calculations before stopping.
3	fFullPrec	1	=1 if the application uses the stored values (full precision ¹) of the referenced cells when performing a calculation.
4	fSomeUncalced	1	=1 if recalculation was not completed before save.
5	fSaveRecalc	1	=1 if the application will recalculate values when the workbook is saved.
6	fMTREnabled	1	=1 if concurrent calculation processes are enabled for this workbook.
7	unused	1	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fNoDeps	1	=1 if the application will perform a full recalculation when one was not indicated by other calculation properties. This attribute allows the application to expose mechanisms in the user interface that give users the ability to trigger when full recalculations take place.
1	unused	7	Reserved

BRTBOOKVIEW

Record 158, Size 29

This record specifies a single Workbook view.

Units for window widths and other dimensions are expressed in twips. Twip measurements are portable between different display resolutions. The formula is (screen pixels) * (20 * 72) / (logical device dpi), where the logical device dpi can be different for x and y coordinates.

Record data			
Offset	Field Name	Size	Contents
0	xWn	4	The x-coordinate (relative to window) of top-left corner of the data validation input prompt (textbox). This is per sheet, not per cell. Units in twips.
4	yWn	4	The y-coordinate (relative to window) of top-left corner of the data validation input prompt (textbox). This is per sheet, not per cell. Units in twips.
8	dxWn	4	Specifies the width of the workbook window. The unit of measurement for this value is twips.
12	dyWn	4	Specifies the height of the workbook window. The unit of measurement for this value is twips.
16	iTabRatio	4	Specifies the ratio between the workbook tabs bar and the horizontal scroll bar. Tab Ratio is assumed to be out of 1000 of the horizontal window width.
20	itabFirst	4	Specifies the index to the first sheet in this book view.
24	itabCur	4	Specifies an unsigned int that contains the index to the active sheet in this book view.
28	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fHidden	1	=1 if the visible state of the book window is set to hidden.
1	fVeryHidden	1	=1 if the visible state of the book window is set to very hidden (VBA only).
2	fIconic	1	=1 if the workbook window is minimized.
3	fDspHScroll	1	=1 if the horizontal scrollbar is shown.
4	fDspVScroll	1	=1 if the vertical scrollbar is shown.
5	fBotAdornment	1	=1 if sheet tabs are shown in the user interface.
6	fAFDateGroup	1	=1 if dates are grouped when presenting the user with filtering options in the user interface.
7	unused	1	Reserved

BRTBEGINEXTERNALS

Record 353, Size 0

This record defines the collection of external references for this workbook.

BRTEENDEXTERNALS

Record 354, Size 0

This record defines the end of the collection of external references for this workbook.

BRTSUPBOOKSRC

Record 355, Variable Size

This record defines an external reference that stores data for workbook elements.

Record data			
Offset	Field Name	Size	Contents
0	strRelId	STR	Specifies a unique identifier that is used to identify a relationship to another part in the file. Relationship identifiers link the element definition with the part where data for the element is stored.

BRTSUPSELF

Record 357, Size 0

This record is a placeholder for use by external references that refer to sheets or objects on the same book represented by the book part (e.g. =Sheet2!A1).

BRTSUPSAME

Record 358, Size 0

This record is a placeholder representing an external reference to the active sheet (e.g. =!A1). This same-sheet type of reference is allowed in macro sheets and defined names only. The reference will evaluate to the sheet calling the macro or defined name.

BRPLACEHOLDERNAME

Record 361, Variable Size

This record is a placeholder used to represent defined names that are referenced by functions using the same-sheet syntax, and user-defined functions (UDFs) implemented by XLLs and COM automation addins.

Record data			
Offset	Field Name	Size	Contents
0	strName	STR	Name of the defined name or UDF.

BRTEXTURNSHEET

Record 362, Variable Size

This record contains a collection of table lookup items that represent external references. Each table lookup item will have an index that refers to a supporting book record and a pair of indexes that refer to sheet indexes. If the record refers to book-level objects, the sheet indexes will be -2. If there was an error with the reference, one or both sheet indexes may be -1.

Record data			
Offset	Field Name	Size	Contents
0	rgxti	RG	Array of metadata records. Each record is described by the XTI structure detailed below

Each XTI structure contains the following fields:

Offset	Field Name	Size	Contents
0	isupbook	4	A 0-based index to one of the brtSup* records (brtSupSelf, brtSupSame, brtSupAddin, brtSupBookSrc).
4	isheetFirst	4	Index of first sheet of an external reference. May be -2 if the reference refers to book-level objects. May be -1 if there was an error in the reference.
8	isheetLast	4	Index of second sheet of an external reference. May be -2 if the reference refers to book-level objects. May be -1 if there was an error in the reference. May be the same as isheetFirst if the external reference points to one sheet.

BRTBEGINPIVOTCACHEIDS

Record 384, Size 0

This record enumerates pivot cache definition parts used by pivot tables and formulas in this workbook.

BRTENDPIVOTCACHEIDS

Record 385, Size 0

This record represents the end of the enumeration of pivot cache definition parts used by pivot tables and formulas in this workbook.

BRTBEGINPIVOTCACHEID

Record 386, Variable Size

This record represents a cache of data for pivot tables and formulas in the workbook.

Record data			
Offset	Field Name	Size	Contents
0	idSx	4	Specifies the unique identifier for the pivot cache for this workbook in the pivot cache part.
4	strcacheRelID	STR	Specifies the identifier to a pivot cache definition part where cached data is stored.

BRTENDPIVOTCACHEID

Record 387, Size 0

This record represents the end of the cache of data for pivot tables and formulas in the workbook.

BRTUSERBOOKVIEW

Record 397, Variable Size

This record specifies a single custom workbook view. A custom workbook view consists of a set of display and print settings that you can name and apply to a workbook. You can create more than one view of the same workbook without saving separate copies of the workbook.

Custom workbook views are created by the end-user via tools in the application user interface.

Record data

Offset	Field Name	Size	Contents
0	xLeft	4	Specifies the X coordinate for the upper left corner of the book window. The unit of measurement for this value is twips.
4	xRight	4	Specifies the width of the workbook window. The unit of measurement for this value is twips.
8	yTop	4	Specifies the Y coordinate for the upper left corner of the book window. The unit of measurement for this value is twips.
12	yBot	4	Specifies the height of the workbook window. The unit of measurement for this value is twips.
16	iTabid	4	Specifies the ID of a sheet in the workbook that is the active sheet in this book view. Corresponds to a sheetId of a sheet in the sheets collection.
20	iTabRatio	4	Specifies the ratio between the workbook tabs bar and the horizontal scroll bar. iTabRatio is assumed to be out of 1000 of the horizontal window width. The default value for this attribute is 600.
24	guid	16	Specifies a globally unique identifier (GUID) for this custom view
40	wMergeInterval	2	Automatic update interval (in minutes). Only applicable for shared workbooks in automatic refresh mode.
42	grbit1	4	See grbit1 description below.
46	strName	STR	Specifies the name of the custom view.

The grbit1 field contains the following flags and fields:

Offset
Field Name
Bits
Contents

0	fIconic	1	=1 if the workbook window is minimized
1	fDspHScroll	1	=1 if the horizontal scrollbar is shown in the user interface.
2	fDspVScroll	1	=1 if the vertical scrollbar is shown in the user interface.
3	fBotAdornment	1	=1 if the sheet tabs are shown in the user interface.
4	fZoom	1	=1 if the workbook window is maximized.
5	fDspFmlaBar	1	=1 if the formula bar is shown in the user interface.
6	fDspStatus	1	=1 if the status bar is shown in the user interface.
7	mdDspNote	2	Specifies how comments are displayed in this custom view =0 if the comment indicators are off =1 if the comment indicators are on =2 if the comment indicators are on and comments are visible

9	mdHideObj	2	Specifies how objects are displayed in this custom view. =0 if objects are shown =1 if object placeholders are shown =2 if objects are hidden
7	unused	4	Reserved
11	fPrintIncl	1	=1 if print settings are included in this custom view.
12	fRowColIncl	1	=1 if hidden rows, columns, and filter settings are included in this custom view.
13	fTimedUpdate	1	=1 if the application will update changes at the interval specified in wMergeInterval. This is only applicable for shared workbooks.
14	fAllMemChanges	1	=1 if when conflicts are found, the changes being saved always take precedence. This is only applicable for shared workbooks in automatic refresh mode.
15	fOnlySync	1	=1 if indicates the current user's changes will not be saved during automatic refresh. The workbook will only be updated with other users' changes. Only applicable for shared workbooks in automatic refresh mode.
16	fPersonalView	1	=1 if this custom view is a personal view for a shared workbook user. Only applicable for shared workbooks. Personal views allow each user of a shared workbook to store their individual print and filter settings.
17	unused	15	Reserved

BRTOLESIZE

Record 549, Size 16

This record defines the embedded object server for this workbook.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	ref	16	Specifies the REF reference for the embedded object.
---	-----	----	--

BRTWEBOPT

Record 553, Size 11

This record defines properties that relate to publishing this workbook to the Web.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	grbit1	2	See grbit1 description below.
---	--------	---	-------------------------------

2	bScreenSize	1	Specifies the screen size on which Web pages will be displayed. The specified screen size might affect the size and layout of images on web pages. 0= 544x376 1= 640x480 2= 720x512 3= 800x600 4= 1024x768 5= 1152x882 6= 1152x900 7= 1280x1024 8= 1600x1200 9= 1800x1440 10=1920x1200
3	dwPixelsPerInch	4	Specifies the DPI (defined as the number of pixels per inch) that will be used to display images in Web pages. The specified DPI affects the size of graphics relative to the size of text on the screen.
7	uiCodePage	4	Specifies the encoding the application will use when a Web page is saved. A code is a table that relates the binary character codes used by a program to keys on the keyboard or to the appearance of characters on the display. Code pages are a means of providing support for the languages used in different countries.

Note: There are a number of code page technologies. One example of potential values can be found at:
<http://www.unicode.org/Public/MAPPINGS/VENDORS/MICROSOFT/WindowsBestFit/>

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fRelyOnCSS	1	=1 if the application will use Cascading Style Sheet (CSS) for font formatting on Web pages.
1	fOrganizeInFolder	1	=1 if the application stores supporting files such as bullets, background textures, and graphics in a separate folder from the Web page
2	fUseLongFileNames	1	=1 if the application allows file names longer than 8 characters for Web pages.
3	unused	1	Reserved
4	fRelyOnVML	1	=1 if the application uses VML (Vector Markup Language) to display graphics in Web browsers.
5	fAllowPNG	1	=1 if the application saves images in the PNG (Portable Network Graphics) graphic format.
6	unused	10	Reserved

BRTBEGINWEBPUBITEMS

Record 554, Size 4

This represents a listing of individual objects in this workbook that have been published (to HTML). Note that when one of these objects is selected to be published, just the object is published to HTML, not the entire workbook contents.

Record data

Offset	Field Name	Size	Contents
---------------	-------------------	-------------	-----------------

0	cItems	4	Number of items.
---	--------	---	------------------

BRTENDWEBPUBITEMS

Record 555, Size 0

This represents the end of the listing of individual objects in this workbook that have been published.

BRTBEGINWEBPUBITEM

Record 556, Variable Size

This record defines a single Web publishing object for the workbook. This record tracks basic information about an object in the workbook, such as a named range, that is published to the Web.

Record data

Offset	Field Name	Size	Contents
---------------	-------------------	-------------	-----------------

0	tws	1	Type of web source (or objects to publish). -1= Nil 0= Workbook 1= Sheet 2= PrintArea 3= AutoFilter 4= Reference 5= Chart 6= PivotTable 7= Query 8= Name
1	grbit1	4	See grbit1 description below.
5	nStyleId	4	Specifies the number, in "nnnnn" format, used in generated div id, in style id's, token filenames, and other variables.
9	ref	16	Source range in REF format.
25	grbit2	1	See grbit description below.
P1	strBkmk	STR	Specifies the destination bookmark (div id) for the published object. This string is written out only if fFirstBkmk is true.
P2	strName	STR	Specifies the named range to be published. If omitted, the entire workbook is published. This string is written out only if fFirstName is true.
P3	strFile	STR	Specifies the destination file name to which the sourceObject will be published. This string is written out only if fFirstFile is true.
P4	strTitle	STR	Specifies the title of the published item. This string is written out only if fFirstTitle is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fNew	1	=1 if this item is not yet published
1	fAutoRepublish	1	=1 if the application will automatically publish the sourceObject when the workbook is saved.
2	unused	1	Reserved
3	fMhtml	1	=1 if publish in MHTML
4	unused	28	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fIrstBkmk	1	=1 if strBkmk publish in MHTML
1	fIrstName	1	=1 if strName is saved after the fixed size portion of the record.
2	fIrstFile	1	=1 if strFile is saved after the fixed size portion of the record.
3	fIrstTitle	1	=1 if strTitle is saved after the fixed size portion of the record.
4	unused	4	Reserved

BRTENDWEBPUBITEM

Record 557, Size 0

The end of a definition of a single Web publishing object for the workbook.

BRSMARTTAGTYPE

Record 596, Variable Size

This record defines a collection of smart tag properties that determine smart tag behavior in the workbook.

Record data			
Offset	Field Name	Size	Contents
P1	strNameSpaceUri	STR	Specifies the namespace Uniform Resource Identifier (URI) for a smart tag used by the application.
P2	strName	STR	Specifies the name used for a smart tag in the application.
P3	strUrl	STR	Specifies the URL for a smart tag provided by the smart tag provider in the application.

BRTBEGINSMARTTAGTYPES

Record 597, Size 0

This record defines the collection of smart tag types in the workbook. Smart tags represent data that is recognized and labeled as a particular type. For example, a person's name or address can be recognized and labeled with a smart tag.

BRTENDSMARTTAGTYPES

Record 598, Size 0

This record defines the end of the collection of smart tag types in the workbook.

BRTBEGINCRERRS

Record 608, Size 4

This record represents the collection of errors found in the file during crash recovery; it also contains some file state information about the crash.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	ft	4	The file type of the document before crash.
---	----	---	---

BRTENDCRERRS

Record 609, Size 0

This record represents the end of the collection of errors found in the file during crash recovery.

BRTCRAASHRECERR

Record 610, Variable Size

This record contains a string describing an error discovered during crash. On load, this error will be displayed to the user.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	strErr	STR	Describes error discovered during crash
---	--------	-----	---

BRTBEGINFNGROUP

Record 664, Size 0

This record defines the collection of function groups for the workbook.

BRTFNGROUP

Record 665, Variable Size

This record represents a single function group.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	strGrp	STR	Specifies the name of the function group.
---	--------	-----	---

BRTENDFNGROUP

Record 666, Size 0

This record defines the end of the collection of function groups for the workbook.

BRITSUPADDIN

Record 667, Size 0

The record is a placeholder representing external references to user defined functions (UDFs) that are implemented by XLL files and COM automation addins. XLL files are not covered in this document. XLL files do not contain user data. More information is available at <http://msdn2.microsoft.com/en-us/library/bb687827.aspx>.

Shared String Objects

The following structures are used in shared string records.

RTRST

Variable Size

A shared data template used by BRTSSTITEM, BRTCOMMENTTEXT, BRTCELLRSTRING, BRTCELL0RSTRING records.

Contained data			
Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
P1	str	STR	A collection of 16 bit Unicode characters in UTF16 little-endian encoding.
P2	rgStrun	RG STRUN	Present only if fRichStr is set. Array of formatting runs (<u>STRUN</u>). Max of 32767 runs.
P3	rgStrPh	RT STR	Present only if fExtRst is set. Array of phonetic characters. Max of 32767 strings.
P4	rgPhruns	RG PHRUNS	Present only if fExtRst is set. Array of phonetic runs (<u>PHRUNS</u>). Max of 32767 runs.
P5	phs	4	Present only if fExtRst is set. Phonetic formatting information (<u>PHS</u>).

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fRichStr	1	=1 if the string is a rich string (has formatting runs).
1	fExtRst	1	=1 if the string has phonetic info (phonetic characters, and/or runs, and/or formatting).
2	unused	6	Reserved

STRUN

Size 4

Contained data			
Offset	Field Name	Size	Contents
0	ich	2	Starting (0-based) index of formatting run in the text, counted in terms of UTF16 chars.
2	ifnt	2	Index of the font to be applied to the run of characters . This font index points into the collection of fonts for the current workbook (see STYLES part).

PHRUNS

Size 6

Contained data

Offset	Field Name	Size	Contents
0	ichFirst	2	Starting (0-based) index of the phonetic run in the phonetic text, counted in terms of UTF16 characters.
2	ichMom	2	Starting (0-based) index of the phonetic run in the base text, counted in terms of UTF16 characters.
4	cchMom	2	Count of UTF16 characters in the base text, corresponding to the current phonetic run.

PHS

Size 4

Contained data

Offset	Field Name	Size	Contents
0	ifnt	2	Index of the phonetic font in the collection of fonts for the current workbook (see STYLES part).
2	phType	2	See phType description below.

The phType field contains the following flags and fields:

Contained data

Offset	Field Name	Bits	Contents
0	phCharType	2	Phonetic Character Type 0= uses narrow katakana characters as phonetic text 0= uses default character type as phonetic text (based on InstallLanguage or other settings) 1= uses wide katakana characters as phonetic text 2= uses hiragana characters as phonetic text 3= uses any type of characters as phonetic text
2	alcH	2	Phonetic Alignment Value 0= phonetic info has general or unspecified alignment 1= phonetic info is left aligned 2= phonetic info is center aligned 3= phonetic info is distributed
4	unused	12	Reserved

Shared Strings Part

A workbook may contain thousands of cells containing string (non-numeric) data. Furthermore this data is very likely to be repeated across many rows or columns. The goal of implementing a single string table that is shared across the workbook is to improve performance in opening and saving the file by only reading and writing the repetitive information once.

Consider for example a workbook summarizing information for cities within various countries. There may be a column for the name of the country, a column for the name of each city in that country, and a column containing the data for each city. In this case the country name is repetitive, being duplicated in many cells. In many cases the repetition is extensive, and a tremendous savings is realized by making use of a shared string table when saving the workbook. When displaying text in the spreadsheet, the cell table will just contain an index into the string table as the value of a cell, instead of the full string.

The shared string table contains all the necessary information for displaying the string: the text, formatting properties, and phonetic properties (for East Asian languages).

Most strings in a workbook have formatting applied at the cell level, that is, the entire string in the cell has the same formatting applied. In these cases, the formatting for the cell is stored in the styles part, and the string for the cell can be stored in the shared strings table. In this case, the strings stored in the shared strings table are simple text elements.

Some strings in the workbook may have formatting applied at a level that is more granular than the cell level. For instance, specific characters within the string may be bolded, have coloring, italicizing, etc. In these cases, the formatting is stored along with the text in the string table, and is treated as a unique entry in the table.

RECORD ORDER

brtBeginSst [Record 159]

 brtSstItem [Record 19] (occurs 1 or more times)

 brtEndSst [Record 160]

BRTSSTITEM

Record 19, Variable Size

This record is the representation of an individual string in the shared string table. If the string is just a simple string with formatting applied at the cell level, then the BRTSSTITEM should contain a single text element used to express the string. However, if the string in the cell is more complex - i.e., has formatting applied at the character level - then the string item shall consist of multiple rich text runs which collectively are used to express the string.

Record data			
Offset	Field Name	Size	Contents
0	brtrst	RSTR	<u>RTRST</u> representing the string item.

BRTBEGINSST

Record 159, Size 8

The beginning of the shared string table.

Record data			
Offset	Field Name	Size	Contents
0	cstTotal	4	Total number of strings in shared string table
4	cstUnique	4	Number of unique strings in shared string table

BRTEENDSST

Record 160, Size 0

The end of the shared string table.

Styles Part

The styles part is the central collection for formatting information shared across a book. This includes cell specific formatting, named cell styles, and non-cell specific feature formatting. Additionally, the style part contains definitions for custom table style(s) and color palette information. The following table shows this logical grouping with regards to BRT records:

Formatting area	BRTs
Cell specific	BRTXF, BRTFMT, BRTFONT, BRTFILL, BRTBORDER
Named cell styles	BRTSTYLE
Feature non-cell specific	BRTDXF
Custom table styles	BRTTABLESTYLES, BRTTABLESTYLE, BRTTABLESTYLEELEMENT
Color management	BRTINDEXEDCOLOR, BRTMRUCOLOR

RECORD ORDER

brtBeginStylesheet [Record 278]

- brtBeginFmts [Record 615] (occurs 0 to 1 times.)
 - brtFmt [Record 44] (occurs 1 or more times.)
- brtEndFmts [Record 616]
- brtBeginFonts [Record 611] (occurs 0 to 1 times.)
 - brtFont [Record 43] (occurs 1 or more times.)
- brtEndFonts [Record 612]
- brtBeginFills [Record 603] (occurs 0 to 1 times.)
 - brtFill [Record 45] (occurs 1 or more times.)
- brtEndFills [Record 604]
- brtBeginBorders [Record 613] (occurs 0 to 1 times.)
 - brtBorder [Record 46] (occurs 1 or more times.)
- brtEndBorders [Record 614]
- brtBeginCellStyleXfs [Record 626]
 - brtxf [Record 47] (occurs 1 or more times.)
- brtEndCellStyleXfs [Record 627]
- brtBeginCellXfs [Record 617]
 - brtxf [Record 47] (occurs 1 or more times.)
- brtEndCellXfs [Record 618]
- brtBeginStyles [Record 619]
 - brtStyle [Record 48] (occurs 1 or more times.)

brtEndStyles [Record 620]
 brtBeginDxfs [Record 505]
 brtDxf [Record 507] (occurs 1 or more times.)
 brtEndDxfs [Record 506]
 brtBeginTableStyles [Record 508]
 brtBeginTableStyle [Record 510] (occurs 0 or more times.)
 brtTableStyleElement [Record 512] (occurs 1 or more times.)
 brtEndTableStyle [Record 511]
 brtEndTableStyles [Record 509]
 brtBeginColorPalette [Record 473] (occurs 0 to 1 times.)
 brtBeginIndexedColors [Record 565] (occurs 0 to 1 times.)
 brtIndexedColor [Record 475] (occurs 1 or more times.)
 brtEndIndexedColors [Record 566]
 brtBeginMRUColors [Record 569] (occurs 0 to 1 times.)
 brtMRUColor [Record 572] (occurs 1 or more times.)
 brtEndMRUColors [Record 570]
 brtEndColorPalette [Record 474]
 brtEndStylesheet [Record 279]

BRTFONT

Record 43, Variable Size

This record defines the properties for one of the fonts used in the workbook.

Record data

Offset	Field Name	Size	Contents
0	dyHeight	2	Height of the font (in units of 1/20 th of a point).
2	grbit1	2	Font attributes (see the following table).
4	bls	2	Bold style; a number from 100 to 1000 (64h to 3E8h) that indicates the character weight ("boldness"). The default values are 190h for normal text and 2BCh for bold text.
6	sss	2	Superscript/subscript: 00h= None 01h= Superscript 02h= Subscript
8	uls	1	Underline style: 00h= None 01h= Single 02h= Double 21h= Single Accounting 22h= Double Accounting

9	bFamily	1	The font family this font belongs to. A font family is a set of fonts having common stroke width and serif characteristics. This is system level font information. The font name overrides when there are conflicting values.
			Value Font Family
		0	Not applicable.
		1	Roman
		2	Swiss
		3	Modern
		4	Script
		5	Decorative
10	bCharset	1	Font character set assigned to display this run.
		0= Ansi	
		1= Default	
		2= Symbol	
		77= Mac	
		128= Japanese	
		129= Korean	
		130= Johab	
		134= GB2312	
		136= Chinese Big 5	
		161= Greek	
		162= Turkish	
		163= Vietnamese	
		177= Hebrew	
		178= Arabic	
		186= Baltic	
		204= Russian	
		222= Thai	
		238= East Europe	
		255= Oem	
11	unused	1	Reserved
12	brtcolor	8	Font color – (see BRTCOLOR for structure)
20	bFontScheme	1	Defines the font scheme, if any, to which this font belongs. When a font definition is part of a theme definition, then the font is categorized as either a major or minor font scheme component. When a new theme is chosen, every font that is part of a theme definition is updated to use the new major or minor font definition for that theme. Usually major fonts are used for styles like headings, and minor fonts are used for body & paragraph text. 0 = None, 1 = Major font scheme, 2 = Minor font scheme
21	strFontFace	STR	This string specifies the face name of this font.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
---------------	-------------------	-------------	-----------------

0	unused	1	Reserved
---	--------	---	----------

1	fItalic	1	=1 if characters are displayed in italic font style. The italic style is defined by the font at a system level and is not specified by this specification.
2	unused	1	Reserved
3	fStrikeout	1	=1 if characters are displayed in strikeout font style.
4	fOutline	1	=1 if characters are displayed in outline font style.
5	fShadow	1	This is a Macintosh compatibility setting. Represents special word/character rendering on Macintosh, when this flag is set. The effect is to render a shadow behind, beneath and to the right of the text.
6	fCondense	1	This is a Macintosh compatibility setting. Represents special word/character rendering on Macintosh, when this flag is set. The effect is to condense the text (squeeze it together). Applications are not required to render according to this flag.
7	fExtend	1	This field specifies a compatibility setting used for previous spreadsheet applications, resulting in special word/character rendering on those legacy applications, when this flag is set. The effect extends or stretches out the text.
8	unused	8	Reserved

BRTFMT

Record 44, Variable Size

This record defines a specific number format which can be used by the application to format and render the value of a cell. Other records (e.g. [BRTXF](#)) refer to a specific number format by ID (e.g. *ifmt* for [BRTXF](#)) that matches the BRTFMT *ifmt* field.

Record data			
Offset	Field Name	Size	Contents
0	ifmt	2	Id of this number format. Other records will refer to this number format with the same id. See endnote for ids. ⁱⁱⁱ
2	strFmt	STR	The number format code for this number format. See endnote for format code information. ^{iv}

BRTFILL

Record 45, Variable Size

This record represents a single cell fill definition. A cell fill consists of either a fill pattern with foreground and background colors, or a gradient color definition to be used in painting the cell interior.

Record data			
Offset	Field Name	Size	Contents
0	fls	4	Fill pattern type. See endnote for example. ^v 0= None 1= solid (foreground color only) 2= medium gray 3= dark gray 4= light gray 5= dark horizontal 6= dark vertical 7= dark down 8= dark up 9= dark grid 10= dark trellis 11= light horizontal 12= light vertical 13= light down 14= light up 15= light grid 16= light trellis 17= gray125 18= gray0625 19 . 39= reserved (not in the UI) 40= gradient
4	brtcolorFore	8	Foreground color of the cell fill pattern. Cell fill patterns operate with two colors: a background color and a foreground color. These combine together to make a patterned cell fill. See BRTCOLOR for field descriptions.
12	brtcolorBack	8	Background color of the cell fill pattern. Cell fill patterns operate with two colors: a background color and a foreground color. These combine together to make a patterned cell fill. See BRTCOLOR for field descriptions.
20	rtgradient	44	gradient definition if fls is gradient otherwise 0. See below description for RTGRADIENT
P1	rtgradientStops	RG 16	BRTFILL is fixed size (64) unless it represents a gradient fill. If this is a gradient fill then the gradient's color stop information follows as a sequence of RTGRADIENTSTOP structures.

The gradient definition ([RTGRADIENT](#)) has the following structure:

Offset	Field Name	Size	Contents
0	type	4	gradient type. 0= Linear 1= Rectangular
4	numDegree	8	Gradient angle – used for linear gradients to determine the angle at which the gradient strokes will be drawn (vertical, horizontal, or diagonal)
12	numFillToLeft	8	Gradient rectangle - used for rectangular gradients to

20	numFillToRight	8	determine the coordinates of the rectangle where the gradient should converge.
28	numFillToTop	8	
36	numFillToBottom	8	

Each gradient stop definition (**RTGRADIENTSTOP**) has the following structure:

Offset	Field Name	Size	Contents
0	brtColor	8	Gradient stop color. See BRTCOLOR for field descriptions.
8	numPosition	8	Position within the gradient range where this gradient stop's color should begin.

BRTBORDER

Record 46, Size 51

Expresses a single set of cell border formats (left, right, top, bottom, diagonal). Color is optional. When missing, 'automatic' is implied.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	rtGlxfTop	10	Top border definition. See RTGLXF below.
11	rtGlxfBottom	10	Bottom border definition. See RTGLXF below.
21	rtGlxfLeft	10	Left border definition. See RTGLXF below.
31	rtGlxfRight	10	Right border definition. See RTGLXF below.
41	rtGlxfDiagonal	10	Diagonal border(s) definition. See RTGLXF below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fBdrDiagUp	1	=1 if the cell's border includes a diagonal line starting at the bottom left corner of the cell and moving up to the top right corner of the cell.
1	fBdrDiagDown	1	=1 if the cell's border includes a diagonal line starting at the top left corner of the cell and moving down to the bottom right corner of the cell.
2	unused	6	Reserved

Each border definition (**RTGLXF**) uses the following structure:

Offset	Field Name	Size	Contents
0	dg	1	Border line type. See endnote for examples. ^{vi} 0= None 1= Thin 2= Medium 3= Dashed 4= Dotted 5= Thick 6= Double 7= Hairline 8= Medium Dashed 9= DashDot 10= MediumDashDot 11= Dash Dot Dot 12= Medium Dash Dot Dot 13= Slant Dash Dot
1	unused	1	Reserved
2	brtColor	8	Color to use for this border. See BRTCOLOR for field descriptions.

BRTXF

Record 47, Size 16

The **BRTXF** record defines the formatting properties associated with cells or named cell styles.

Record data

Offset	Field Name	Size	Contents
0	ixfeParent	2	Should be FFFFh for named cell style BRTXF records. For cell BRTXF records this is the zero-based index of the BRTXF record for the named cell style applied to this cell. By default the Normal style (0) is applied to cells.
2	ifmt	2	Id of the number format (BRTFMT) record that defines the number formatting for this XF.
4	ifont	2	Zero-based index of the font record (BRTFONT) that defines the font properties for this XF.
6	ifill	2	Zero-based index of the fill record (BRTFILL) that defines the fill properties for this XF.
8	ixborder	2	Zero-based index of the border record (BRTBORDER) that defines the border properties for this XF.
10	trot	1	Text rotation in cells. Expressed in degrees. Values range from 0 to 180. The first letter of the text is considered the center-point of the arc. For 0 - 90, the value represents degrees above horizon. For 91-180 the degrees below the horizon is calculated as: [degrees below horizon] = 90 - trot. See endnote for examples. ^{vii}

11	indent	1	An integer value, where an increment of 1 represents 3 spaces. Indicates the number of spaces (of the normal style font) of indentation for text in a cell. Note: The width of one space character is defined by the font. Only left, right, and distributed horizontal alignments are supported.
12	grbit1	1	See grbit1 description below.
13	grbit2	1	See grbit2 description below.
14	grbit3	2	See grbit3 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	alc	3	horizontal alignment type: 0= general, 1= left, 2= center, 3= right, 4= fill, 5= justify, 6= center across
3	alcv	3	vertical alignment type: 0= top, 1= center, 2= bottom, 3= justify
6	fWrap	1	=1 if the text in a cell should be line-wrapped within the cell.
7	fJustLast	1	=1 if the cells justified or distributed alignment should be used on the last line of text. This is typical for East Asian alignments but not typical in other contexts.

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fShrinkToFit	1	=1 if the displayed text in the cell should be shrunk to fit the cell width. Not applicable when a cell contains multiple lines of text.
1	unused	1	Reserved
2	iReadingOrder	2	An integer value indicating whether the reading order (bidirectionality) of the cell is left-to-right, right-to-left, or context dependent. 0= Context Dependent 1= Left-to-Right 2= Right-to-Left
4	fLocked	1	=1 if the cell is locked. When cells are marked as "locked" and the sheet is protected, then the options specified in the Sheet Part's <u>BRTSHEETPROTECTION</u> record that are prohibited for these cells.

5	fHidden	1	=1 if the cell is hidden. When the cell is hidden and the sheet on which the cell resides is protected, then the cell value will be displayed in the cell grid location, but the contents of the cell will not be displayed in the formula bar. This is true for all types of cell content, including formula, text, or numbers. Therefore the cell A4 may contain a formula "=SUM(A1:A3)", but if the cell protection property of A4 is marked as hidden, and the sheet is protected, then the cell should display the calculated result (for example, "6"), but will not display the formula used to calculate the result.
6	fSxButton	1	=1 if the cell rendering includes a pivot table dropdown button.
7	f123Prefix	1	=1 if the text string in a cell should be prefixed by a single quote mark (e.g., 'text). In these cases, the quote is not stored in the Shared Strings Part.

The grbit3 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fAttrNum	1	=1 if the number formatting specified for this XF should be applied.
1	fAttrFnt	1	=1 if the font formatting specified for this XF should be applied.
2	fAttrAlc	1	=1 if the alignment formatting specified for this XF should be applied.
3	fAttrBdr	1	=1 if the border formatting specified for this XF should be applied.
4	fAttrPat	1	=1 if the fill formatting specified for this XF should be applied.
5	fAttrProt	1	=1 if the protection formatting specified for this XF should be applied.
6	unused	10	Reserved

BRTSTYLE

Record 48, Variable Size

This record expresses the name and related formatting records for a named cell style in the workbook. A named cell style is a collection of formatting properties (e.g., cell border, cell fill, and font type/size/style) grouped together by name that can be applied to a cell.

Record data			
Offset	Field Name	Size	Contents
0	ixf	4	Zero-based index referencing a BRTXF record in the BRTBEGINCELLSTYLEXFS collection, which defines the formatting for this named cell style.
4	grbit1	2	See grbit1 description below.
6	istyBuiltIn	1	The index of a built-in cell style. See table in endnote for IDs. ^{viii}

7	iLevel	1	Outline level for outline style RowLevel_n or ColLevel_n. The automatic outline styles — RowLevel_1 through RowLevel_7, and ColLevel_1 through ColLevel_7 — are stored by setting istyBuiltIn to 01h or 02h and then setting iLevel to the style level minus 1. If the style is not an automatic outline style, ignore this field.
8	strName	STR	The name of the cell style.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fBuiltIn	1	=1 if this is a built-in cell style (istyBuiltIn will have ID)
1	fHidden	1	=1 if this style is not shown in the application UI. Usually used to keep track of built-in styles that the user does not want to display in the UI.
2	fCustom	1	=1 if this built-in cell style has been customized. By default built-in styles are only saved if actually used in the workbook. This flag indicates that a built-in style has been modified, and therefore should be saved with the workbook, even if not currently in use.
3	unused	13	Reserved

BRTBEGINSTYLESHEET

Record 278, Size 0

This is the beginning of the root element of the Styles part.

BRTENDSTYLESHEET

Record 279, Size 0

This is the end of the root element of the Styles part.

BRTBEGINCOLORPALETTE

Record 473, Size 0

This record marks the start of a container used to store custom color related information. The most recently used custom colors selected while using this workbook (if any) will be represented by a [BRTMRUCOLOR](#) records collection. If the workbook uses a non-default legacy custom color palette, the palette's custom indexed colors will appear in a [BRTINDEXEDCOLOR](#) records collection.

BRTENDCOLORPALETTE

Record 474, Size 0

This record marks the end of a container used to store custom color related information.

BRTINDEXEDCOLOR

Record 475, Size 4

This record represents a single indexed color definition as an ARGB entry.

Record data			
Offset	Field Name	Size	Contents
0	cv	4	Color value in alpha, red, green, blue format (ARGB).

BRTBEGINDXFS

Record 505, Size 4

This record marks the start of the container for differential formatting records (BRTDXFs.) Whereas BRTXFSs specify values for all possible formatting properties associated with a cell, BRTDXFs are used to represent a set of specific formatting properties. Several features use one or more DXFs to store their formatting information referring to them with a zero-based index into this collection.

Record data			
Offset	Field Name	Size	Contents
0	cdxfs	4	Count of DXF elements.

BRTENDDXFS

Record 506, Size 0

This record marks the end of the container for differential formatting records.

BRTDXF

Record 507, Variable Size

This record represents a set of specific formatting properties. Several features use one or more DXFs to store their formatting information referring to them with a zero-based index into the DXF collection.

Record data			
Offset	Field Name	Size	Contents
0	unused (bits 0..14)	2	Reserved
	fNewBorder (bit 15)		=1 if left, right, top, bottom borders should apply to outline of a range =0 if left, right, top, bottom borders should apply to each cell in a range
2	xfprops	RG	Array of formatting properties, not written in the usual RG format. See XFPROPS structure.

The XFPROPS structure is as follows:

Offset	Field Name	Size	Contents
0	unused	2	Reserved
2	cprops	2	Count of properties to follow.
4	properties	RG	Properties. Each property definition begins with an XFPROPHEADER structure.

The XFPROPHEADER structure is as follows:

XFPROPHEADER structure

Offset	Field Name	Size	Contents
0	xfpropType	2	Format property type
2	cb	2	size of this property structure in bytes (including header)

The XFPROPHEADER is followed by a variable amount of data as determined by the XF property type (xfpropType). Unknown property types are skipped on load. BIFF12 defines the following XF property types. The data kind describes the actual structure used to represent the property type's information. If present each property entry will modify the corresponding XF property (see XF records definition.)

xfpropType	Value	Data kind
Fill pattern (Fls)	0	xfpropByte
ForeColor	1	xfpropColor
BackColor	2	xfpropColor
Gradient	3	xfpropGradient
GradientStop	4	xfpropGradientStop
TextColor	5	xfpropColor
BorderTop	6	xfpropBorder
BorderBottom	7	xfpropBorder
BorderLeft	8	xfpropBorder
BorderRight	9	xfpropBorder
BorderDiag	10	xfpropBorder
BorderVertical	11	xfpropBorder
BorderHorizontal	12	xfpropBorder
BorderDiagUp	13	xfpropBorder
BorderDiagDown	14	xfpropBorder
HorizontalAlign	15	xfpropByte
VerticalAlign	16	xfpropByte
TextRotation	17	xfpropByte
TextIndent	18	xfpropWord
ReadingOrder	19	xfpropByte
WrapText	20	xfpropByte
JustifyText	21	xfpropByte
ShrinkToFit	22	xfpropByte
(reserved)	23	xfpropByte

TextName	24	xfpropString
Bold	25	xfpropWord
Underline	26	xfpropWord
SuperSubscript	27	xfpropWord
Italic	28	xfpropByte
StrikeThru	29	xfpropByte
Outline	30	xfpropByte
Shadow	31	xfpropByte
Condense	32	xfpropByte
Extend	33	xfpropByte
CharSet	34	xfpropByte
FontFamily	35	xfpropByte
TextSize	36	xfpropDWord
FontScheme	37	xfpropByte
NumFormat	38	xfpropString
(reserved)	39	xfpropDWord
(reserved)	40	xfpropDWord
NumFormatIndex	41	xfpropWord
TextRelativeIndent	42	xfpropWord
Locked	43	xfpropByte
Hidden	44	xfpropByte

xfpropByte –Used for properties defined by a single byte of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	data	1	Single byte of data

xfpropWord –Used for properties defined by a single word of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	data	2	Single word (2 bytes) of data

xfpropDWord –Used for properties defined by a single double word of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type

2	cb	2	Byte length of this property with header.
4	data	4	Single double word (4 bytes) of data

xfpropColor – Used for properties that represent a single color of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	grbit	1	Bit 0: fValidRGBA =0 if the RGB color needs to be resolved Bits 1..7: xclrType 0= Automatic color handling 1= Traditional indexed color 2= RGB color 3= Theme color 4= Color not set
5	xclrIndex	1	Color index if indexed or theme color
6	nTintShade	2	Tint and shade to apply
8	dwRgba	4	RGB color

xfpropBorder – Used for properties that represent a single cell border of data: (extends xfpropColor with single word describing border line type {dg})

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	grbit	1	Bit 0: fValidRGBA =0 if the RGB color needs to be resolved Bits 1..7: xclrType 0= Automatic color handling 1= Traditional indexed color 2= RGB color 3= Theme color 4= Color not set
5	xclrIndex	1	Color index if indexed or theme color
6	nTintShade	2	Tint and shade to apply
8	dwRgba	4	RGB color
12	dgBorder	2	Border line style

xfpropString – Used for properties that can be represented with a single character string of data:

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	cchName	2	Length of string in 2 byte characters

6	strName	STR	The actual string characters, without the length value
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xfpropGradient – Used for properties to represent a gradient fill definition.

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	type	4	Gradient type
8	numDegree	8	Gradient angle
16	numFillToLeft	8	Left coordinate
24	numFillToRight	8	Right coordinate
32	numFillToTop	8	Top coordinate
40	numFillToBottom	8	Bottom coordinate

xfpropGradientStop – Used to define the gradient stops of the preceding xfpropGradient.

Offset	Name	Size	Contents
0	xfpropType	2	Indicates property type
2	cb	2	Byte length of this property with header.
4	unused	2	Reserved
6	numPosition	8	Gradient stop position, of type NUM
14	grbit	1	Bit 0: fValidRGB =0 if the RGB color needs to be resolved) Bits 1..7: xclrType 0= Automatic color handling 1= Traditional indexed color 2= RGB color 3= Theme color 4= Color not set
15	xclrIndex	1	Color index if indexed or theme color
16	nTintShade	2	Tint and shade to apply
18	dwRgba	4	RGB color

BRTBEGINTABLESTYLES

Record 508, Variable Size

This record represents the beginning of the collection of custom table styles defined in the workbook. A table style is a collection of formatting that can be applied to structured regions of a table or pivot table.

Record data

Offset	Field Name	Size	Contents
0	cts	4	Count of table styles defined in this collection.
P1	strDefList	STR	Name of default table style to apply to new Tables. This can be set by the user interface.

P2 strDefPivot STR Name of the default table style to apply to new PivotTables. This can be set by the user interface.

BRTENDTABLESTYLES

Record 509, Size 0

This record represents the end of the collection of custom table styles defined in the workbook.

BRTBEGINTABLESTYLE

Record 510, Variable Size

This record marks the beginning of a collection of records that represent a custom table style defined in the workbook. A table style is a collection of formatting that can be applied to structured regions of a table or pivot table. For example, make the header row & totals bold face, and apply light gray fill to alternating rows in the data portion of the table to achieve striped or banded rows.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	ctse	4	Count of table style elements defined for this table style.
6	strName	STR	Name of this table style.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	unused	1	Reserved
1	fIsPivot	1	=1 if this table style should be shown as an available pivot table style.
2	fIsTable	1	=1 if this table style should be shown as an available table style.
3	unused	13	Reserved

BRTENDTABLESTYLE

Record 511, Size 0

This record marks the end of a collection of records that represent a custom table style defined in the workbook.

BRTTABLESTYLEDLEMENT

Record 512, Size 12

This record specifies formatting for one element of a table style. Each table style element describes the formatting that should be applied to a particular area of a table or pivot table when the table style is applied.

Record data

Offset	Field Name	Size	Contents
0	tseType	4	Identifies this table style element's type. 0 = WholeTable 1 = HeaderRow 2 = TotalRow 3 = FirstColumn 4 = LastColumn 5 = RowStripe1 6 = RowStripe2 7 = ColumnStripe1 8 = ColumnStripe2 9 = FirstHeaderCell 10 = LastHeaderCell 11 = FirstTotalCell 12 = LastTotalCell 13 = SubtotalColumn1 14 = SubtotalColumn2 15 = SubtotalColumn3 16 = SubtotalRow1 17 = SubtotalRow2 18 = SubtotalRow3 19 = BlankRow 20 = ColumnSubheading1 21 = ColumnSubheading2 22 = ColumnSubheading3 23 = RowSubheading1 24 = RowSubheading2 25 = RowSubheading3 26 = PageFieldLabels 27 = PageFieldValues
4	size	4	Number of rows or columns in a single band of striping if type is FirstRowStripe, SecondRowStripe, FirstColumnStripe, or SecondColumnStripe.
8	dxfid	4	Zero-based index to a BRTDXF record in the DXFs collection, specifying the formatting properties to use with this table style element.

BRTCOLOR

Record 564, Size 8

The **BRTCOLOR** record structure is used to represent an Excel color. Excel supports four different types of colors: automatic, indexed, RGBA, and themed.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	icv	1	Themed or indexed color value.
2	nTintAndShade	2	Specifies the tint value applied to the color. If tint is supplied, then it is applied to the RGB value of the color to determine the final color applied. The tint value is signed with largest possible negative value meaning 100% darken, largest possible positive value meaning 100% lighten, and 0 meaning no change.
4	bRed	1	Standard Red color value (ARGB).
5	bGreen	1	Standard Green color value (ARGB).
6	bBlue	1	Standard Blue color value (ARGB).
7	bAlpha	1	Standard Alpha color value (ARGB).

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fValidRGBA	1	If =1 the RGBA values have already been determined for indexed or themed color including application of nTintAndShade.
1	xcolorType	7	Excel supports 4 color types: 0 = Automatic 1 = Indexed color (icv is index into color palette) 2 = RGB 3 = Themed color (icv is theme color index)

BRTBEGININDEXEDCOLORS

Record 565, Size 0

This record marks the beginning of a container of indexed color definition records. This collection of colors is only written out if a non-default indexed color palette is being used for the workbook. If this collection is present each color in the color palette is defined by a corresponding indexed color record ([BRTINDEXCOLOR](#)). Indexed colors while deprecated (no longer present in the user interface in Microsoft Office System 2007) are still used for backwards compatibility with legacy formats.

BRTENDINDEXEDCOLORS

Record 566, Size 0

This record marks the end of the container of indexed color definition records.

BRTBEGINMRUCOLORS

Record 569, Size 0

This record marks the beginning of the container of the most recently used custom colors selected by the user for this workbook. This collection is only present if the user has used the color picker to choose a custom color. The most recently used custom colors (up to 10) are stored in this collection as [BRTMRUCOLOR](#) records, with the most recent being first.

BRTENDMRUCOLORS

Record 570, Size 0

This record marks the end of the container of the most recently used custom colors selected by the user for this workbook.

BRTMRUCOLOR

Record 572, Size 8

This record is used to represent a custom color that the user has recently used in the workbook.

Record data

Offset	Field Name	Size	Contents
0	brtcolorMRU	8	Recently used custom color. See BRTCOLOR for structure.

BRTBEGINFILLS

Record 603, Size 4

This record marks the start of the container for cell fill records. A cell fill consists of either a fill pattern with foreground and background colors, or a gradient color definition to be used in painting the cell interior.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cfills	4	Count of fill elements.
---	--------	---	-------------------------

BRTENDFILLS

Record 604, Size 0

This record marks the end of the container for cell fill records.

BRTBEGINFONTS

Record 611, Size 4

This record marks the beginning of the container for all font definitions in this workbook.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cfonts	4	Count of font elements.
---	--------	---	-------------------------

BRTENDFONTS

Record 612, Size 0

This record marks the end of the container for font definition records in this workbook.

BRTBEGINBORDERS

Record 613, Size 4

This record marks the start of the container for cell borders formatting information, specifying all border definitions used by cells and named cell styles in the workbook. The border formatting properties of format records ([BRTXFS](#)) in the Styles Part are referenced by a zero-based index (*ixborder*) to a border format record ([BRTBORDER](#)) in this collection.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cborders	4	Count of border elements.
---	----------	---	---------------------------

BRTENDBORDERS

Record 614, Size 0

This record marks the end of the container for cell borders formatting information, specifying all border definitions used by cells and named cell styles in the workbook.

BRTBEGINFMTS

Record 615, Size 4

This record marks the start of the container for defining the number formats in this workbook.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cfmts	4	Count of number format elements.
---	-------	---	----------------------------------

BRTENDFMTS

Record 616, Size 0

This record marks the end of the container for number format records in this workbook.

BRTBEGINCELLXFS

Record 617, Size 4

This record marks the start of the container used to specify the formatting properties of cells in the workbook. Each cell record in the Sheet Part references a formatting record in this collection with a zero-based index (*ixfe*).

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cxfs	4	Count of cell XF elements.
---	------	---	----------------------------

BRTENDCELLXFS

Record 618, Size 0

This record marks the end of the container used to specify the formatting properties of cells in the workbook.

BRTBEGINSTYLES

Record 619, Size 4

This record marks the beginning of the container for the named cell styles, consisting of a sequence of named style records. A named cell style is a collection of formatting properties (e.g., cell border, cell fill, and font type/size/style) grouped together by name that can be applied to a cell.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cstyles	4	Count of style elements.
---	---------	---	--------------------------

BRTENDSTYLES

Record 620, Size 0

This record marks the end of the container for the named cell styles, consisting of a sequence of named style records.

BRTBEGINCELLSTYLEXFS

Record 626, Size 4

This record marks the start of the container used to specify the formatting properties of named cell styles in the workbook. Each **BRTSTYLE** record references with a zero-based index (*ixf*) one formatting record (**BRTXF**) in this collection. The **BRTXF** record defines the formatting properties associated with the named cell style.

Record data**Offset Field Name Size Contents**

0	cXfs	4	Count of cell style XF elements.
---	------	---	----------------------------------

BRTENDCELLSTYLEXFS

Record 627, Size 0

This record marks the end of the container used to specify the formatting properties of named cell styles in the workbook.

Metadata Part

A cell in a spreadsheet application can have metadata associated with it. Metadata is a set of additional properties about the particular cell.

There are two types of metadata: cell metadata and value metadata. Cell metadata contains information about the cell itself, and this metadata can be carried along with the cell as it moves (insert, shift, copy/paste, merge, unmerge, etc). Value metadata is information about the value of a particular cell. Value metadata properties can be propagated along with the value as it is referenced in formulas.

The file format is architected such that it supports both value and cell metadata, as well as even allowing for future extensions. Formulas, such as CUBEMEMBER() or CUBE*, shall make use of value metadata. So only value metadata must be implemented as it is used by MDX cube functions for retrieving data from OLAP data sources. The other parts are allowed for future extensibility.

RECORD ORDER

brtBeginMetadata [Record 332]

 brtBeginEsmdtinfo [Record 334] (Occurs 0 to 1 times)

 brtMdtinfo [Record 335] (Occurs 1 or more times)

 brtEndEsmdtinfo [Record 336]

 brtBeginEsstr [Record 380] (Occurs 0 to 1 times)

 brtStr [Record 59] (Occurs 1 or more times)

 brtEndEsstr [Record 381]

 brtBeginEsmdx [Record 372] (Occurs 0 to 1 times)

 brtBeginMdx [Record 54] (Occurs 1 or more times)

 brtBeginMdxTuple [Record 56] (Occurs 0 or more times)

 (Used when tfnSrc in BRTBEGINMDX is one, two, or five)

 brtMdxMbrIstr [Record 58] (Occurs 1 or more times)

 brtEndMdxTuple [Record 57]

 brtBeginMdxSet [Record 374] (Occurs 0 or more times)

 (Used when tfnSrc in BRTBEGINMDX is three or four)

 brtMdxMbrIstr [Record 58] (Occurs 1 or more times)

 brtEndMdxSet [Record 375]

 brtBeginMdxKPI [Record 378] (Occurs 0 or more times)

 (Used when tfnSrc in BRTBEGINMDX is seven)

 brtEndMdxKPI [Record 379]

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brtEndMdx [Record 55]
brtEndEsmdx [Record 373]
brtBeginEsfmd [Record 339] (Occurs 0 or more times.)
    brtBeginFmd [Record 52] (Occurs 1 or more times.)
        brtEndFmd [Record 53]
    brtEndEsfmd [Record 340]
    brtBeginEsmdb [Record 337] (Occurs 0 to 2 times)
        brtMdb [Record 51] (Occurs 1 or more times)
    brtEndEscmdb [Record 338] (Occurs 0 to 1 times)
brtEndMetadata [Record 333]

```

BRTMDB

Record 51, Variable Size

This record represents a block of metadata records.

Record data			
Offset	Field Name	Size	Contents
0	rgmdir	RG 8	Array of metadata records. Each record is described by the MDIR structure detailed below

Each MDIR structure contains the following fields:

Offset	Field Name	Size	Contents
0	imdt	4	A 1-based index to the metadata type information (BRTMDTINFO) records.
4	mdd	4	Index of metadata record value in the storage corresponding to record type.

BRTBEGINFMD

Record 52, Size 0

Represents the beginning of a future metadata record.

BRTENDFMD

Record 53, Size 0

Represents the end of a block of metadata records.

BRTBEGINMDX

Record 54, Size 8

Represents a single record of mdx metadata information which can express a tuple, KPI, set, or member property.

Record data			
Offset	Field Name	Size	Contents
0	istrConnName	4	The zero based index of connection name in metadata string store found in BRTSTR .
4	tfnSrc	4	This is an enumeration representing the type of the calling cube function from the spreadsheet. =1 CubeMember =2 CubeValue =3 CubeSet =4 CubeSetCount =5 CubeRankedMember =6 CubeMemberProperty =7 CubeKPIProperty

BRTENDMDX

Record 55, Size 0

Represents the end of a single record of mdx metadata information which can express a tuple, KPI set, or member property.

BRTBEGINMDXTUPLE

Record 56, Variable Size

Represents an mdx tuple. A tuple is the intersection of two or more members of distinct dimensions in the cube. For instance, the three members (product, City, month) that are used to show the data point for how many products were sold. The spreadsheet application should allow the values for the attributes of this element to be specified by the OLAP server.

Record data			
Offset	Field Name	Size	Contents
0	cMbrs	4	The number of member expressions in the tuple.
4	dwSrvFmtBack	4	Specifies the background color in RGB values. It is in hex and is read in the form of 0x00RRGGBB.
8	dwSrvFmtFore	4	Represents the foreground color in RGB. It is in hex and is read in the form of 0x00RRGGBB.
12	grbit1	2	See grbit1 description below.
P1	dwSrvFmtNum	4	Server formatting built-in number format index. This is an index into the spreadsheet application's built in number formats that is used to specify formatting. This field is written out only if fSrvFmtNum in grbit1 is true, fSrvFmtNumStr in grbit1 is false, and fSrvFmtCurrency in grbit1 is false.
P1	dwSrvFmtNumStr	4	Server formatting string index in the metadata string store, used to index to a string that contains information on how to format the number. This field is written out only if fSrvFmtNum in grbit1 is true, fSrvFmtNumStr in grbit1 is true, and fSrvFmtCurrency in grbit1 is false.
P1	strCulture	STR	The culture tag to use for currency number format. This field is written out only if fSrvFmtNum in grbit1 is true and fSrvFmtCurrency in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fSrvFmtNum	1	=1 if number formatting is applied.
1	fSrvFmtCurrency	1	=1 if currency formatting is applied
2	fSrvFmtNumStr	1	=1 if number formatting is translated
3	fSrvFmtBack	1	=1 if background color is applied.
4	fSrvFmtFore	1	=1 if foreground color is applied.
5	fSrvFmtItalic	1	=1 if italic formatting is applied.
6	fSrvFmtUnderline	1	=1 if the underline font style is applied.
7	fSrvFmtBold	1	=1 if the bold style is applied.
8	fSrvFmtStrikeThrough	1	=1 if the strikethrough font style is applied.
9	unused	7	Reserved

BRTENDMDXTUPLE

Record 57, Size 0

Represents the end of an mdx tuple.

BRTMDXMBRISTR

Record 58, Size 5

This record contains the index of a member unique name in string store.

Record data

Offset	Field Name	Size	Contents
0	istr	4	Index of a member unique name in string store.
4	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fCubeSet	1	=1 if this string represents a set.
1	unused	7	Reserved

BRTSTR

Record 59, Variable Size

Record containing mdx metadata string information.

Record data

Offset	Field Name	Size	Contents
0	str	STR	Mdx metadata string information.

BRTBEGINMETADATA

Record 332, Size 0

Represents the beginning of the root container for all metadata information in the spreadsheet.

BRTENDMETADATA

Record 333, Size 0

Represents the end of the root container for all metadata information in the spreadsheet.

BRTBEGINESMDTINFO

Record 334, Size 4

Marks the beginning of a collection of metadata types.

Record data			
Offset	Field Name	Size	Contents
0	cmdatinfo	4	Number of metadata types.

BRTMDTINFO

Record 335, Variable Size

This record contains information about metadata on cells - it defines a specific set of behaviors that the metadata shall adhere to when subject to other spreadsheet operations. In general, many of these attributes represent operations that can be performed on a cell that allow the metadata to remain associated with the cell.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	metadataID	4	The earliest version of the spreadsheet application that supports this metadata type.
8	strName	STR	Represents the name of this particular metadata type. This name shall be unique amongst all other BRTMDTINFO records.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhostRw	1	=1 if metadata is copied to/from a ghost row.
1	fGhostCol	1	=1 if metadata is copied to/from a ghost column.
2	fEdit	1	=1 if metadata survives the editing of the cell's value.
3	fDelete	1	=1 if metadata persists after deletion of a cell value.
4	fCopy	1	=1 if metadata is copied to other cells when this cell is copied. This shall be set to true if the paste attributes for the MDTINFO are going to be used.

5	fPasteAll	1	=1 if the metadata is populated on a Paste: All. Paste: All and regular paste should be implemented so that they are equivalent by the spreadsheet application. fCopy should be set to true for this paste behavior to be respected. Note: the spreadsheet application can implement special pasting behavior, such as pasting everything from a cell (paste all/normal paste), pasting only borders, pasting only comments, or pasting only any other specific cell property.
6	fPasteFmlas	1	=1 if metadata is populated by Paste: Formulas. fCopy should be set to true for this paste behavior to be respected.
7	fPasteValues	1	=1 if metadata is populated by Paste: Values. fCopy should be set to true for this paste behavior to be respected.
8	fPasteFmts	1	=1 if metadata is populated by Paste Special: Formats. fCopy should be set to true for this paste behavior to be respected.
9	fPasteComments	1	=1 if metadata is populated by Paste: Comments. fCopy should be set to true for this paste behavior to be respected.
10	fPasteDv	1	=1 if metadata is populated by Paste: Validation. fCopy should be set to true for this paste behavior to be respected.
11	fPasteBorders	1	=1 if metadata is populated with Paste: Borders. fCopy should be set to true for this paste behavior to be respected.
12	fPasteColWidths	1	=1 if metadata is populated by Paste: Column Widths. fCopy should be set to true for this paste behavior to be respected.
13	fPasteNumFmts	1	=1 if metadata is populated with Paste: Number Formats. fCopy should be set to true for this paste behavior to be respected.
14	fMerge	1	=1 if metadata survives cell merge. It is up to the spreadsheet application on how to deal with conflicts when two cells that each have metadata are merged. The guidance here is to treat it the same as a 'regular' cell merge with the default behavior being that the data in the upper left cell wins.
15	fSplitFirst	1	=1 if a merged cell is split its metadata is copied to only the first resulting cell.
16	fSplitAll	1	=1 if a merged cell split action has its metadata copied to all of the resulting cells. If fSplitFirst is also set to true, fSplitAll has priority and all the cells shall have the metadata copied to them.
17	fRwColShift	1	=1 if metadata survives shifting due to row/column insertion/deletion.

18	fClearAll	1	=1 if metadata survives a "Clear: All" operation. The Clear operations can be implemented by the run time application to provide an easy way to allow users to delete everything from a cell (Clear: All), remove only comments (Clear: Comments), only remove formats (Clear: Formats), or only remove the contents but leave the comments and formatting (Clear: Contents). Note these operations can also be performed by the user manually deleting each item.
19	fClearFmts	1	=1 if metadata remains after a "Clear: Formats" operation.
20	fClearContents	1	=1 if metadata persists after a "Clear: Contents" action.
21	fClearComments	1	=1 if the metadata persists after a "Clear: Comments" action.
22	fAssign	1	=1 if metadata is propagated by formula assignment operation.
23	unused	5	Reserved
28	fCanCoerce	1	=1 if value metadata can be removed when this metadata data type is coerced to another type.
29	fAdjust	1	=1 if metadata corresponding to a particular cell needs to be notified when that cell's location is changed. Note: This is included in the file format for future extensibility.
30	fCellMeta	1	=1 if metadata is cell metadata. =0 if metadata is value metadata.
31	Unused	1	Reserved

BRTENDESMDTINFO

Record 336, Size 0

Marks the end of a collection of metadata types.

BRTBEGINESMDB

Record 337, Size 8

Represents the beginning of the cell metadata or value metadata blocks storage.

Record data			
Offset	Field Name	Size	Contents
0	cmdb	4	Number of blocks of metadata records.
4	fCellMeta	4	=1 if metadata is cell metadata. =0 if metadata is value metadata.

BRTENDESMDB

Record 338, Size 0

Represents the end of the cell metadata or value metadata blocks storage.

BRTBEGINESFMD

Record 339, Variable Size

Represents the beginning of the storage of future metadata information of a particular type. Future data storage areas are storage areas that a later version of the spreadsheet application can store data into. So a V2 spreadsheet application may store data for new features that don't exist in the V1 version in a future storage area when saving to a format that the V1 version can open. The V1 version may be able to open the file, but won't necessarily be able to understand data that is stored in a future storage area. So the V1 version may ignore this data, but still round trip it in the file format so that V2 and V1 users can collaborate on the same spreadsheet.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cfdm	4	Number of future metadata blocks.
4	strName	STR	Metadata type name.

BRTEENDESFMD

Record 340, Size 0

Represents the end of a block of future metadata information.

BRTBEGINESMDX

Record 372, Size 4

Represents the beginning of a collection of specific metadata records for the spreadsheet. This is used to build up the members, sets, tuples, KPIs, and member properties for the spreadsheet.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cmdx	4	Number of mdx metadata records.
---	------	---	---------------------------------

BRTEENDESMDX

Record 373, Size 0

Represents the end of a collection of specific metadata records for the spreadsheet.

BRTBEGINMDXSET

Record 374, Size 12

Represents an mdx set.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	istrSetDef	4	Zero based index of the set definition in the metadata string store.
---	------------	---	--

4	ss0	4	An enumeration specifying what sort order is used to sort the set. =0 None =1 Ascending =2 Descending =3 Alpha ascending =4 Alpha descending =5 Natural ascending =6 Natural descending
8	cMbrsSortBy	4	Number of sort-by member indices. This is essentially the number of coordinates in the cube that this member is defined by.

BRTENDMDXSET

Record 375, Size 0

Represents the end of an mdx set.

BRTBEGINMDXMBRPROP

Record 376, Size 8

Represents an mdx member property.

Record data

Offset Field Name Size Contents

0	istrMbr	4	The zero based index of member unique name in the metadata string store.
4	istrProp	4	The zero based index of the property name in metadata string store.

BRTENDMDXMBRPROP

Record 377, Size 0

Represents the end of an mdx member property.

BRTBEGINMDXKPI

Record 378, Size 12

Represents key performance indicator (KPI) metadata. A KPI is typically an image that represents the state of some specific business measure at a given point in time. For instance, an image of a green traffic light indicating that customer satisfaction is good.

Record data

Offset Field Name Size Contents

0	istrKPIName	4	Index of key performance indicator name in string store.
---	-------------	---	--

4	kpiprop	4	Key performance indicator property. =1 Value =2 Goal =3 Status =4 Trend =5 Weight =6 Current time member
8	istrMbrKPI	4	Index of member unique name in string store.

BRTEENDMDXKPI

Record 379, Size 0

Represents the end of a key performance indicator (KPI) mdx metadata.

BRTBEGINESSTR

Record 380, Size 4

Represents the beginning of the metadata string store. This is a collection of strings that are used as a resource for the rest of the metadata part. It contains all the required OLAP strings used in the spreadsheet including the connection name, as well as mdx expressions identifying specific members and sets. It is indexed from individual metadata records so that the records can use these strings to build up the necessary mdx statements to retrieve the correct data from the OLAP cube.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cstr	4	Number of records in the string store.
---	------	---	--

BRTENDESSTR

Record 381, Size 0

Represents the end of the metadata string store.

CalcChain Part

The cells in a workbook can be calculated in different orders depending on various optimizations and dependencies. The calculation chain specifies the order in which the cells in a workbook were last calculated.

The calculation chain only deals with cells that require calculation - i.e., it only deals with cells that contain formulas. It does not track or express dependencies amongst the formulas, but rather only records the order in which the cells were last calculated.

The calculation chain order may change over time. One obvious way this can happen is that new formulas can be added, formulas can be removed or updated. The spreadsheet application may also optionally implement partial calculation as an optimization. Partial calculation is when the spreadsheet only recalculates cells that have had their dependencies or values changed. This way, when a number in a cell is changed, requiring an update to a dependent formula, only the cells that are affected by the update will be recalculated, as opposed to recalculating the entire workbook.

The calculation chain described in this section is not required by the spreadsheet application, but can be used if the spreadsheet application finds it useful. It can be loaded by a spreadsheet application, or the application may optionally construct it at run time in memory based on formula dependencies. Since the data described in this section is not strictly required, the spreadsheet application is free to ignore the order in which the calculation chain specifies calculations - i.e., even if the calculation chain is loaded, the spreadsheet application is free to perform calculations in a different order at run time.

Example:

Consider the following workbook (the formulas shown instead of cell values):

	A	B	C	D	E
1	1 =A1	=B1+A1	=C1+B1+A1	=D1+C1+B1+A1	
2					
3					
4					
5	1 =A5	=B5+A5	=C5+B5+A5	=D5+C5+B5+A5	
6					
7					

There is a constant entered in A1 and A5, and next to each of those cells are a series of cells which contain formulas that depend on those cells.

After entering the cells on the first row, and then the cells on the 5th row, the calc chain records would be saved in the following cell order:

- (1) E5
- (2) D5
- (3) C5
- (4) B5
- (5) E1
- (6) D1
- (7) C1
- (8) B1

It is in this order because B1 was calced first (it was the first formula entered in the workbook), followed by C1, D1, and so on. Then B5 was entered in the 5th row, followed by the other cells in the 5th row, ending with E5.

But, after a full recalculation, the spreadsheet application has realized that cells B5:E5 are on the same child chain, and cells B1:E1 are likewise on their own child chain. The calc chain records would now be saved in the following cell order:

- (1) B1
- (2) C1
- (3) D1
- (4) E1
- (5) B5
- (6) C5
- (7) D5
- (8) E5

RECORD ORDER

`brtBeginCalcChain` [Record 528]

`brtCalcCell` [Record 63] (occurs 1 or more times)

`brtEndCalcChain` [Record 529]

BRTBEGINCALCCHAIN

Record 528, Size 0

This record represents the beginning of the calculation chain.

BRTCALCCELL

Record 63, Size 13

This record represents a single formula cell in the calc chain.

Record data

Offset Field Name Size Contents

0	itabid	4	Id of a sheet the cell belongs to.
4	rw	4	The row of the cell
8	col	4	The column of the cell
12	grbit1	1	See <code>grbit1</code> description below.

The `grbit1` field contains the following flags and fields:

Offset Field Name Bits Contents

0	fChildFmla	1	=1 if the formula is on the child chain of the preceding non-child (parent) formula
---	------------	---	---

1	fNewDepLevel	1	=1 if the formula starts a new dependency level, 0 otherwise. A beginning of a dependency is a synchronization point for multi-threaded calculation: all concurrent calculations, and child calculations, must be completed - and the cells have new values - before the calculation can continue. In other words, each dependency level may depend on levels that came before it, and any later dependency levels may depend on this level; but no later dependency levels can have any calculations started until this dependency level completes.
2	fNewThread	1	=1 if the cell's formula starts a new thread.
3	fArrayFmla	1	=1 if the cell's formula is an array formula.
4	unused	4	Reserved

BRTENDCALCCHAIN

Record 529, Size 0

This record represents the end of the calculation chain.

Volatile Dependencies Part

The Volatile Dependencies part provides a cache of data that supports Real Time Data (RTD) and CUBE functions in the workbook. CUBE functions require connectivity to external servers to retrieve their data; RTD functions require connectivity to external servers to retrieve their data, or an RTD server can be run on the same machine.

For RTD functions, an RTD interface defines how data is provided on the server, and how it is retrieved on the client. Similarly, CUBE functions access data in OLAP cubes via their own function syntax. The volatileDependencies part provides that cache of data and supporting information about these functions and their data servers and connections. This allows the spreadsheet application to work with cached values when recalculating the workbook when the external server is not available.

Note: CUBE function cached values are not saved in the volatileDependencies part.

RECORD ORDER

brtBeginVolDeps [Record 514]

 brtBeginVolType [Record 516] (occurs 1 or more times)

 brtBeginVolMain [Record 518] (occurs 1 or more times)

 brtBeginVolTopic [Record 520] (occurs 1 or more times)

 One of the following four items:

 brtVolNum [Record 524]

 brtVolErr [Record 525]

 brtVolStr [Record 526]

 brtVolBool [Record 527]

 Then the following:

 brtVolSubTopic [Record 522] (occurs 0 or more times)

 brtVolRef [Record 523] (occurs 1 or more times)

 brtEndVolTopic [Record 521]

 brtEndVolMain [Record 519]

 brtEndVolType [Record 517]

 brtEndVolDeps [Record 515]

BRTBEGINVOLDEPS

Record 514, Size 0

Represents the beginning of the collection of external dependencies for a workbook.

The collection stores the cached values, parameters used, and connection and server names for Real Time Data (RTD) and CUBE functions.

BRTENDVOLDEPS

Record 515, Size 0

Represents the end of the collection of external dependencies for a workbook.

BRTBEGINVOLTYPE

Record 516, Size 4

Represents dependency information for a specific type or external data server. There is no limit on the number of external dependencies that may exist for a workbook.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	type	4	Specifies the type of the external dependency. 0= RTD function 1= CUBE function
---	------	---	---

BRTENDVOLTYPE

Record 517, Size 0

Represents the end of dependency information for a specific type or external data server.

BRTBEGINVOLMAIN

Record 518, Variable Size

Represents dependency information for all topics within a type that share the same first string or function argument.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	str	STR	Specifies the first string of all topics within this main. This string corresponds to the first argument to the RTD or CUBE function. For RTD functions, this argument represents the progID of the IRTDServer. For CUBE functions, this argument represents the CUBE connection. For more information on RTD and CUBE functions, see Formulas .
---	-----	-----	--

BRTENDVOLMAIN

Record 519, Size 0

Represents the end of the dependency information for all topics within a type that share the same first string or function argument.

BRTBEGINVOLTOPIC

Record 520, Size 0

Represents the beginning of dependency information for a single topic. For the RTD function, this collection will contain the remaining parameters of the function, and indicate the last known value and data type of that value. For CUBE functions, it does the same, except that the last known value/data type is ignored during load/save.

BRTENDVOLTOPIC

Record 521, Size 0

Represents the end of dependency information for a single topic.

BRTVOLSUBTOPIC

Record 522, Variable Size

`BRTVOLSUBTOPIC` records are used to maintain all strings in the topic except for the first. Each of these strings requires an individual `BRTVOLSUBTOPIC`. For example, for the topic `{"progid", "", "foo"}`, there would be two `BRTVOLSUBTOPIC`s, one containing string `" "`, the other containing string `"foo"`. For Cube functions, value of "1" indicates that all of the related cells with calling cube functions have been refreshed.

Record data			
Offset	Field Name	Size	Contents
0	strSubtopic	STR	A string in the topic

BRTVOLREF

Record 523, Size 12

Represents the reference to a cell that depends on the current topic. Each topic may have one or more cells dependencies. For CUBE functions, each `BRTVOLREF` contains a cell whose cube function call dependent on the connection in `BRTVOLMAIN`.

Record data			
Offset	Field Name	Size	Contents
0	rw	4	Specifies the cell's row location.
4	col	4	Specifies the cell's column location.
8	ish	4	Specifies the index of the cell's associated sheet.

BRTVOLNUM

Record 524, Size 8

This record contains the value of the current topic's cell.

Record data			
Offset	Field Name	Size	Contents
0	num	8	Specifies the value of the current topic's cell. This value is of type NUM.

BRTVOLERR

Record 525, Size 1

This record contains the value of the current topic's cell.

Record data			
Offset	Field Name	Size	Contents
0	err	1	Represents the error value of the current topic's cell. This error value is one of the following: 0= #NULL! (a null range reference) 7= #DIV0! (divide by zero) 15= #VALUE! (an invalid value) 23= #REF! (an invalid cell reference) 29= #NAME? (an unrecognized name/label) 36= #NUM! (an invalid number) 42= #N/A (no value available)

BRTVOLSTR

Record 526, Variable Size

This record contains the value of the current topic's cell.

Record data			
Offset	Field Name	Size	Contents
0	str	STR	Specifies the string value of the current topic's cell.

BRTVOLBOOL

Record 527, Size 1

This record contains the value of the current topic's cell.

Record data			
Offset	Field Name	Size	Contents
0	f	1	Specifies the Boolean value of the current topic's cell.

Tables Part

A table helps organize and provide structure to lists of information in a worksheet. Tables have clearly labeled columns, rows, and data regions. Tables make it easier for users to sort, analyze, format, manage, add, and delete information.

If a region of data is designated as a Table, then special behaviors can be applied which help the user perform useful actions. For example, if the user types additional data in the row adjacent to the bottom of the table, the table can expand and automatically add that data to the data region of the table. Similarly, adding a column is as easy as typing a new column heading to the right or left of the current column headings. Filter and sort abilities can automatically be surfaced to the user via the drop down arrows. Special calculated columns can be created which summarize or calculate data in the table. These columns have the ability to expand and shrink according to size of the table, and maintain proper formula referencing.

Tables can be created from data already present in the worksheet, from an external data query, or from mapping a collection of repeating XML elements to a worksheet range.

Note that Excel 2003 referred to these objects as lists.

This part has two forms:

1. Non-Single Cell Table: Each of these tables gets its own part, and the relationship between a table part and the sheet is defined in the sheet's _rels directory. The sheet part also references this id since there can be more than one table on a sheet. The sheet part contains all the numeric and textual data, and the table part records properties of the table as well as some formatting rules for data and text displayed in the table cells.
2. Single Cell XML Table: Single cell XML tables are a special type of table that are only one cell in size. This type of table is created through the Excel XML Source task pane. These tables don't have the full set of properties that multi cell tables do. They only have the XML properties and core table properties that are needed to create a table and XML mapping. For instance, the formatting properties, totals row, and headers row don't exist for the single cell XML tables. The formatting for these cells is maintained in the style sheet. If the table is a single cell XML table then that table and any other single cell XML tables will all be put into the part. In this case the part's name is tableSingleCells1.

RECORD ORDER

The table part is used for two different but related cases. In the normal case the part will contain properties for a single table. In the second case the table part is used to store one or more XML single cell tables (created via the XML Source task pane). In this second case an extra record level is added with `brtBeginSingleCells` [Record 341] occurring before `brtBeginTable` and `brtEndSingleCells` [Record 342] occurring after `brtEndTable`.

`brtBeginTable` [Record 343]

`<Autofilter Records>` (Occurs 0 to 1 times)

`<Sort State Records>` (Occurs 0 to 1 times)

```

brtBeginTableCols [Record 345]
    brtBeginTableCol [Record 347] (Occurs 1 or more times)
        brtTableCcFmla [Record 351] (Occurs 0 to 1 times)
        brtTableTrFmla [Record 352] (Occurs 0 to 1 times)
        brtBeginTableXmlCPr [Record 349] (Occurs 0 to 1 times)
        (Only valid for XML single cell tables)
        brtEndTableXmlCPr [Record 350]
    brtEndTableCol [Record 348]
brtEndTableCols [Record 346]
brtTableStyleClient [Record 513]
brtEndTable [Record 344]

```

BRTBEGIN SINGLECELLS

Record 341, Size 0

This record is the beginning of a container for a collection of single cell XML tables.

BRTEND SINGLECELLS

Record 342, Size 0

This record is the end of a container for a collection of single cell XML tables.

BRTBEGIN TABLE

Record 343, Variable Size

Marks the beginning of the root container for a table that is not a single cell XML table.

Record data			
Offset	Field Name	Size	Contents
0	refTable	16	The REF range on the relevant sheet that the table occupies. The reference includes the totals row if it is shown.
16	lt	4	0= if the table was created from a range of cells. 1= if the table was created from a SharePoint (WSS) list. 2= if the table was created from XML Mapper data (XML Source task pane). 3= if the table was created from a query table.
20	idTable	4	A non zero integer representing the unique identifier for this table. Each table in the workbook shall have a unique id. Ids can be used to refer to the specific table in the workbook. For instance, a future records bucket could refer to the table using this id.

24	crwHeader	4	An integer representing the number of header rows showing at the top of the table. Zero means that the header row is not shown. It is up to the spreadsheet application to determine if numbers greater than one are allowed. Unless the spreadsheet application has a feature where there may ever be more than one header row, this number should not be higher than one.
28	crwTotals	4	An integer representing the number of totals rows that shall be shown at the bottom of the table. Zero means that the totals row is not shown. It is up to the spreadsheet application to determine if numbers greater than one are allowed. Unless the spreadsheet application has a feature where they may ever be more than one totals row, this number should not be higher than one.
32	grbit1	4	See <code>grbit1</code> description below.
36	nDxfHeader	4	A zero based integer index into the differential formatting records in the <code>STYLES</code> part indicating which format to apply to the header row of this table.
40	nDxfData	4	A zero based integer index into the differential formatting records in the <code>STYLES</code> part indicating which format to apply to the data area of this table.
44	nDxfAgg	4	A zero based integer index into the differential formatting records in the <code>STYLES</code> part indicating which format to apply to the totals row of this table.
48	nDxfBorder	4	A zero based integer index into the differential formatting records in the <code>STYLES</code> part indicating what border formatting to apply to the borders of this table.
52	nDxfHeader Border	4	A zero based integer index into the differential formatting records in the <code>STYLES</code> part indicating what border formatting to apply to the header row of this table.
56	nDxfAggBorder	4	A zero based integer index into the differential formatting records in the <code>STYLES</code> part indicating what border formatting to apply to the totals row of this table.
60	dwConnID	4	An integer representing an ID to indicate which connection from the external connections part is used by this table.
P1	strName	STR	A string representing the name of the table that is used to reference the table programmatically through the spreadsheet applications object model. This string shall be unique per table per sheet. It has the same length and character restrictions as <code>strDisplayName</code> . By default this should be the same as the table's <code>strDisplayName</code> .
P2	strDisplayName	STR	A string representing the name of the table. This is the name that shall be used in formula references, and displayed in the UI to the spreadsheet user. This name shall not have any spaces in it, and it must be unique amongst all other <code>strDisplayNames</code> and <code>strDefinedNames</code> in the workbook. The character lengths and restrictions are the same as for labels (defined names).

P3	strComment	STR	A string representing a textual comment about the table. This can be used by the spreadsheet application in other UI. For example, there may be name UI that is used to organize defined names and function references, if tables are listed in that UI the comment can give more information about the table. The maximum length of this string should be 32767 characters.
P4	strStyleHeader	STR	A string representing the name of the cell style that is applied to the header row cells of the table. If this string is missing or invalid, then the header row style specified by the current table style should be applied.
P5	strStyleData	STR	A string representing the name of the cell style that is applied to the data area cells of the table. If this string is missing or invalid, then the data cell style specified by the current table style should be applied.
P6	strStyleAgg	STR	A string representing the name of the cell style that is applied to the totals row cells of the table. If this string is missing or invalid, then the totals row style specified by the current table style should be applied.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fShownTotalRow	1	=1 if the totals row has ever been shown in the past for this table.
1	fSingleCell	1	=1 if this table is an XML single cell table that was created through Excel's XML Source task pane.
2	fForceInsert ToBeVisible	1	=1 if the insert row is showing. The insert row should only be shown if the table has no data. Note: When a user clicks the insert row in the UI, it provides them an easy way to enter data into a table.
3	fInsertRowInsCells	1	=1 if cells in the sheet had to be inserted when the insert row was shown for this table. Note: This happens when there are values in cells immediately below the table when the table is created and the insert row is shown. In this case, blank cells for the insert row are inserted and the existing values in the sheet are shifted down by one row to make room.
4	fPublished	1	=1 if this table is marked as published for viewing by a server based spreadsheet application. Note: Such an application might only display objects from the workbook that are marked as published, thus being able to load and calculate the entire workbook but only show the specific items that are marked as published. This can allow the server spreadsheet rendering to provide a more restricted view of the workbook.
5	unused	27	Reserved

BRTENDTABLE

Record 344, Size 0

Marks the end of the root container for a table that is not a single cell XML table.

BRTBEGINTABLECOLS

Record 345, Size 4

A record representing the beginning of the collection of all table columns for this table.

Record data**Offset Field Name Size Contents**

0	nCols	4	An integer representing the total count of how many columns there are in this table. This count shall include both query-defined and user-defined columns.
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BRTENDTABLECOLS

Record 346, Size 0

A record representing the end of the collection of all table columns for this table.

BRTBEGINTABLECOL

Record 347, Variable Size

A record representing a single column for this table.

Record data**Offset Field Name Size Contents**

0	idField	4	An integer representing the unique identifier of this column. This shall be unique per table.
4	iltा	4	An enumeration indicating which type of aggregation to show in the totals row cell for this column. =0 Does not calculate the total =1 Returns the arithmetic mean =2 Counts the number of cells that are not empty =3 Counts the number of cells that contain numbers =4 Returns the largest value =5 Returns the smallest value =6 Adds all the numbers =7 Estimates standard deviation =8 Estimates variance =9 Calculates the formula provided in BRTTABLETRFMLA .
8	nDxfHdr	4	A zero based integer index into the differential formatting records in the BRTBEGINSTYLESHEET record indicating which format to apply to the header cell of this column.

12	nDxfInsertRow	4	A zero based integer index into the differential formatting records in the <u>BRTBEGINSTYLESHEET</u> record indicating which format to apply to the data area of this column. This formatting shall also apply to cells on the insert row for this column.
16	nDxfAgg	4	A zero based integer index into the differential formatting records in the <u>BRTBEGINSTYLESHEET</u> record indicating which format to apply to the totals row cell of this column.
20	idqsif	4	An integer representing the query table field ID corresponding to this table column. The relationship between this table and the corresponding query table is expressed in the <u>_rels</u> part for this table. Each <u>BRTBEGINQSIF</u> has an <u>idField</u> member, and this id is what is referenced here.
P1	strName	STR	A string representing the unique name of the table column. This string is used to bind the column to a field in a data table, so it shall only be used when this table's <u>lt</u> in the <u>BRTBEGINTABLE</u> record is 3 (query table) or 2 (XML Mapper). This name shall be unique per table when it is used. For tables created from xml mappings, by default this should be the same as the name of the column, and should be kept in synch with the name of the column if that name is altered by the spreadsheet application.
P2	strCaption	STR	A string representing the display name of the table column. This string is used to bind the column to a field in a data table, so it shall only be used when this table's <u>lt</u> in the <u>BRTBEGINTABLE</u> record is 3 (query table) or 2 (XML Mapper). This name shall be unique per table when it is used.
P3	strTotal	STR	A string to show in the totals row cell for this column. This string shall be ignored unless <u>lt</u> in the <u>BRTBEGINTABLE</u> record is set to zero for this column, in which case it is displayed in the totals row.
P4	strStyleHeader	STR	A string representing the name of the cell style that is applied to the header row cell of this column. If this string is missing or invalid, then header row style specified by the current table style should be applied. This cell style should get precedence over the header row style defined by the table (<u>nDxfHeader</u> in <u>BRTBEGINTABLE</u>).
P5	strStyleInsertRow	STR	A string representing the name of the cell style that is applied to the cells in the data area of this table column. If this string is missing or invalid, then the data cell style specified by the current table style should be applied. This cell style should get precedence over the data cell style defined by the table (<u>nDxfData</u> in <u>BRTBEGINTABLE</u>).

P6	strStyleAgg	STR	A string representing the name of the cell style that is applied to the Totals Row cell of this column. If this string is missing or invalid, then the totals row cell style specified by the current table style should be applied. This cell style should get precedence over the totals row cell style defined by the table (<u>nDxfAgg</u> in <u>BRTBEGINTABLE</u>).
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BRTENDTABLECOL

Record 348, Size 0

A record representing the end of a single column for this table.

BRTBEGINTABLEXMLCPR

Record 349, Variable Size

A record defining the XML column properties for a column. This is only used for tables created from XML mappings.

Record data

Offset Field Name Size Contents

0	dwMapId	4	An integer representing the ID of the XML map this table field is associated with. The XML map will be defined in the xml maps part, and the Map record should have the corresponding id.
4	grbit1	4	See grbit1 description below.
8	lfxidtDisk	4	An enumeration indicating which XML data type is used by this column. See end note for the enumeration information. ^{ix}

P1	strXPath	STR	A string representing the XML path to the record this column is associated with. The spreadsheet application should support XPath limited to the following: <ul style="list-style-type: none"> The XPath is an absolute path to a simple-content record or attribute The XPath does not express axes, but uses the default child axes An optional filter can be expressed at the end of the XPath The filter can only contain a single expression comparing a named attribute to a specific value Filters are only supported on XPaths that resolve to a simple-content record (not attributes) The named attribute must be defined as an attribute of the simple-content record The attribute name must be preceded by the short-hand (@) symbol representing the axes 'attribute' An arbitrary amount of white-space can be embedded between filter tokens
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Examples:

"/ns1:root/ns1:row/ns1:column1" is supported if 'column1' is a child-most node, but not "/ns1:root/ns1:row" for the same document since 'row' is not a child.
 "/ns1:root/ns1:row" is supported, but not
 "/ns1:root/child::ns1:row"
 "/ns1:root/ns1:row/ns1:column1[@foo='abc']" is supported, but not "/ns1:root/ns1:row[@foo='abc']/ns1:column1"
 "/ns1:root/ns1:row/ns1:column1[@foo='abc']" is supported, but not
 "/ns1:root/ns1:row/ns1:column1[attribute::foo='abc']"
 "/ns1:root/ns1:row/ns1:column1[@ foo='abc']" is valid

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fFilled	1	=1 if the contents of the column have been filled down (denormalized) due to flattening. This should be used when an XML mapping parent value has many children, and both the parent and child fields are mapped to their own column in the table.
1	fCanBeSingle	1	=1 if this column can be represented as a single cell XML table.
2	unused	30	Reserved

BRTENDTABLEXMLCPR

Record 350, Size 0

A record defining the end of the XML column properties for a column. This is only used for tables created from XML mappings.

BRTTABLECCFMLA

Record 351, Variable Size

Columns in a table can have cells that are calculated, usually based on values in other cells in the table. This record stores the formula that is used to perform the calculation for each cell in this column. It shall be understood that formulas which reference columns of this table, shall be calculated using the cells in those columns on the same row of the table as the cell that the formula resides in.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	FMLA	FMLA	The formula that is used to perform the calculation for each cell in this column.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	unused	1	Reserved
1	fArray	1	=1 if this formula is an array style formula.
2	unused	6	Reserved

BRTTABLETRFMLA

Record 352, Variable Size

This record contains a custom formula for aggregating values from the column. Each BRTBEGINTABLECOL has an ilter member that can be used for simple aggregations such as average, standard deviation, min, max, count, and others. If a custom calculation is desired, then this record should be used and the ilter should be set to nine.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	FMLA	FMLA	The custom formula for aggregating values from the column.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	unused	1	Reserved
1	fArray	1	=1 if this formula is an array style formula
2	unused	6	Reserved

BRTTABLESTYLECLIENT

Record 513, Variable Size

This record describes which table style is used to display this table, and specifies which portions of the table have the style applied. Table styles define a set of formatting

properties that may be easily applied to a range of cells in the spreadsheet application. A table style can be applied to a table, but tables can define specific parts of the table that should not have the style applied independently of other table parts. For instance a table may not apply the row striping of the style, and may not show the style's formatting of the last column, but will apply the column striping and the formatting to the first column.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	strName	STR	A string representing the name of the table style to use with this table. If the style name isn't valid then the spreadsheet application should use default style.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fFirstColumn	1	=1 if the first column has the style applied.
1	fLastColumn	1	=1 if the last column has the style applied.
2	fRowStripes	1	=1 If row stripe formatting is applied.
3	fColumnStripes	1	=1 if column stripe formatting is applied.
4	unused	12	Reserved

QSI Part

Represents the properties of a single query table. Query tables are two dimensional tables of data bound to an external query of some kind. A query table could for example show specific data from a text file, from a web query, or from a database query.

RECORD ORDER

`brtBeginQsi` [[Record 447](#)]

`brtBeginQsir` [[Record 449](#)] (Occurs 0 to 1 times)

`brtBeginQsifs` [[Record 455](#)]

`brtBeginQsif` [[Record 457](#)] (Occurs 1 or more times)

`brtEndQsif` [[Record 458](#)]

`brtEndQsifs` [[Record 456](#)]

`brtBeginDeletedNames` [[Record 451](#)] (Occurs 0 to 1 times)

`brtBeginDeletedName` [[Record 453](#)] (Occurs 1 or more times)

`brtEndDeletedName` [[Record 454](#)]

`brtEndDeletedNames` [[Record 452](#)]

`<Sort State Records>` (Occurs 0 to 1 times)

`brtEndQsir` [[Record 450](#)]

`brtEndQsi` [[Record 448](#)]

BRTBEGINQSI

Record 447, Variable Size

This record specifies all the relevant properties for a query table, one query table record is stored for each query table object in the document.

Record data

Offset	Field Name	Size	Contents
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0	<code>grbit1</code>	4	See <code>grbit1</code> description below.
---	---------------------	---	--

4	itblAutoFmt	2	Identifies which legacy table autoformat to apply. See endnote for representations. ^x 0= Simple 1= Classic 1 2= Classic 2 3= Classic 3 4= Accounting 1 5= Accounting 2 6= Accounting 3 7= Accounting 4 8= Colorful 1 9= Colorful 2 10= Colorful 3 11= List 1 12 = List 2 13= List 3 14= 3D effects 1 15= 3D effects 2 16= None
6	dwConnID	4	Specifies the index of the external data connection to use to refresh data in this query table.
10	strName	STR	Specifies the name of the query table.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fTitles	1	=1 if the first row of the query table contains column titles.
1	fRowNums	1	=1 if the first column of the query table should display row numbers.
2	fDisableRefresh	1	=1 if the query table is not refreshable.
3	fAsync	1	=1 if the query table shall try to refresh data in the background.
4	fNewAsync	1	=1 if data has never been refreshed for this query table. If the very first background data refresh had not completed at the time the file was saved, this member will be set to true.
5	fAutoRefresh	1	=1 if the query table shall refresh its data automatically when the document is loaded or opened.
6	fShrink	1	Specifies the type of behavior expected for dealing with a variable number of rows of data in the query table between refresh operations. =1 if the expected behavior is to insert cells for new data, delete unused cells =0 if the expected behavior is to insert cells for new data, clear unused cells, assuming fOverwrite is false as well

7	fOverwrite	1	Specifies the type of behavior expected for dealing with a variable number of rows of data in the query table between refresh operations. =1 if the expected behavior is to overwrite existing cells with new data, clear unused cells. =0 if the expected behavior is to insert cells for new data, clear unused cells, assuming fShrink is false as well.
8	fFill	1	=1 if formulas in columns adjacent to the query table should be filled down whenever the query table is refreshed. This is helpful since the number of rows returned by a query table refresh operation can vary.
9	fSaveData	1	=1 if the query table preserves all of its data in the worksheet when the document is saved. =0 if the data in the worksheet for this query table is cleared during document save. Note: this is very helpful for situations where people who have different permissions to view data want to share the same spreadsheet document. All data from the last user will be removed, and new users re-query the external data sources with their own credentials.
10	fDisableEdit	1	=1 if the connection used with this query table is not editable.
11	fPreserveFmt	1	=1 if the application should try to preserve formatting in the query table and copy this formatting to any new rows of data.
12	fAutoFit	1	=1 if the application should automatically adjust column widths on refresh to fit the data retrieved.
13	fDummyList	1	=1 if this query table is in an intermediate state, having been defined but not fully formed and populated with data. In this state, fields and ranges of the query table may be unknown.
14	fApplyNumberFormats	1	=1 if legacy table autoformat number format properties are applied to the query table on refresh.
15	fApplyFontFormats	1	=1 if legacy table autoformat font format properties are applied to the query table on refresh.
16	fApplyAlignmentFormats	1	=1 if legacy table autoformat alignment format properties are applied to the query table on refresh.
17	fApplyBorderFormats	1	=1 if legacy table autoformat border format properties are applied to the query table on refresh.

18	fApplyPatternFormats	1	=1 if legacy table autoformat pattern format properties are applied to the query table on refresh.
19	fApplyWidthHeightFormats	1	=1 if legacy table autoformat width/height format properties are applied to the query table on refresh.
20	unused	12	Reserved

BRTENDQSI

Record 448, Size 0

This record marks the end of all of the relevant properties for a query table.

BRTBEGINQSIR

Record 449, Size 10

This record contains information related to refreshing the query table.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	idFieldNext	4	Specifies the next unique <u>BRTBEGINQSIF</u> id number available for assignment.
6	ccolExtraLeft	2	Specifies the number of extra columns included at the left end of the field array that aren't bound to external data.
8	ccolExtraRight	2	Specifies the number of extra columns included at the right end of the Table that aren't bound to external data.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fPersist	1	=1 if features should be preserved for this query table across data refresh operations. =0 the query table might be more or less recreated from scratch when data is refreshed. In this case, all user deleted or rearranged columns, user inserted columns that aren't bound to external data, and table column formatting are discarded.
1	fPersistSort	1	=1 if sorting should be preserved for this query table across data refresh operations.
2	fPersistAutoFilter	1	=1 if autofilter should be preserved for this query table across data refresh operations.
3	fidWrapped	1	Whether or not the idFieldNext value wrapped around.
4	fTitlesOld	1	Whether or not the Query Table had titles last refresh.

5	wVerBefore RefreshAlert	5	For backward compatibility with legacy versions of spreadsheet applications, this member specifies the minimum version of the application that is expected to correctly refresh the data in the query table without any problems. For Excel one of the following version numbers: 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
10	unused	6	Reserved

BRTENDQSIR

Record 450, Size 0

This record marks the end of the properties related to refreshing the query table.

BRTBEGINDELETEDNAMES

Record 451, Size 4

This record marks the beginning of the collection which represents the columns or fields that have been deleted from the query table.

Record data

Offset Field Name Size Contents

0	nCols	4	Specifies how many deleted fields there are.
---	-------	---	--

BRTENDDELETEDNAMES

Record 452, Size 0

This record marks the end of the collection which represents columns/fields that have been deleted from the query table.

BRTBEGINDELETEDNAME

Record 453, Variable Size

This record specifies a field that has been deleted from the query table.

Record data

Offset Field Name Size Contents

0	strName	STR	Specifies the name of the deleted field.
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BRTENDDELETEDNAME

Record 454, Size 0

This record ends properties for a column/field that has been deleted from the query table.

BRTBEGINQSIFS

Record 455, Size 4

This record marks the beginning of the collection of fields/columns in the query table.

Record data**Offset Field Name Size Contents**

0	nCols	4	Specifies the number of fields/columns there are in this query table. Includes both query-defined and user-defined columns, but not deleted columns.
---	-------	---	--

BRTENDQSIFS

Record 456, Size 0

This record marks the end of the collection for fields/columns in the query table.

BRTBEGINQSIF

Record 457, Variable Size

This record begins the container for the properties related to a specific field/column in a query table.

Record data**Offset Field Name Size Contents**

0	grbit1	4	See grbit1 description below.
4	idField	4	Specifies the unique identifier of this query table field.
8	idlstf	4	Specifies the unique identifier for the table column if the query table is attached to a table object rather than just a range in the sheet.
12	strName	STR	Specifies the unique name of this query table field. This string is written only if fFirstName in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fUserIns	1	=1 if this column was inserted into the Query Table and is not in the query.
1	fFillDown	1	=1 if the formula in this field/column should be filled down on data refresh.
2	fRowNums	1	=1 if this column contains the row numbers for the records returned.
3	fClipped	1	=1 if this field/column is currently clipped and thus not visible in the worksheet. This state might occur for example when a query table is defined near the edge of a worksheet or other object in the spreadsheet that can't be overwritten with external data. In this case some of the fields are displayed, but not all of them.
4	fFirstName	1	=1 if strName is saved after the fixed size portion of the record.
5	unused	27	Reserved

BRTENDQSIF

Record 458, Size 0

This record ends the container for the properties related to a specific column/field in a query table.

Supplementary Book Data Part

The Supplementary Book Data (SupBook) Part contains external links. External links are used when linking the workbook to other workbooks or external data. The most frequent feature for linking a workbook to other workbooks is through the use of formulas. In this case the formula references a range or defined name in another workbook. Hyperlinks on cells and other spreadsheet objects are also considered an external link. OLE links are yet another technology used to link the workbook to another object. Finally, Dynamic Data Exchange, or DDE, servers can be used to access external data. DDE servers are accessed through formulas in the workbook.

RECORD ORDER

brtBeginSupBook [Record 360]

 brtSupTabs [Record 359] (occurs 0 to 1 times)

 brtSupNameStart [Record 577] (occurs 0 or more times)

 brtSupNameFmla [Record 585]

 brtSupNameBits [Record 586]

 brtSupNameValueStart [Record 578] (occurs 0 to 1 times)

 Per Name, the of the following 4 items is written:

 brtSupNameNum [Record 580]

 brtSupNameBool [Record 584]

 brtSupNameErr [Record 581]

 brtSupNameSt [Record 582]

 brtSupNameNil [Record 583]

 brtSupNameValueEnd [Record 579]

 brtSupNameEnd [Record 587]

 brtExternTableStart [Record 363] (occurs 0 or more times)

 brtExternRowHdr [Record 366] (occurs 0 or more times)

 Per cell, the following items are written:

 brtExternValueMeta [Record 472]

 One of the following 5 Records

 brtExternCellBlank [Record 367]

 brtExternCellReal [Record 368]

 brtExternCellBool [Record 369]

 brtExternCellError [Record 370]

 brtExternCellString [Record 371]

 brtExternTableEnd [Record 364]

`brtEndSupBook` [Record 588]

BRTSUPTABS

Record 359, Variable Size

This record is the container for all of the worksheet names in a supporting workbook.

Record data

Offset Field Name Size Contents

0	rgstr	RG STR	Array of worksheet names in a supporting workbook
---	-------	-----------	---

BRTBEGINSUPBOOK

Record 360, Variable Size

This record is the beginning of a container for specific types of external links.

Record data

Offset Field Name Size Contents

0	sbt	4	The type of supporting book. 0= Normal external book. Can be resident or nonresident. 1= DDE link. 2= OLE link.
P1	strBookRelId	STR	Relationship to supporting book file path. This string is written out only if the sbt equals zero.
P1	strDdeService	STR	The DDE service name. This string is written out only if the sbt equals one.
P1	strOleRelId	STR	Relationship to supporting OLE object path. This string is written out only if the sbt equals two.
P2	strDummy	STR	A blank string. This string is written out only if the sbt equals zero.
P2	strDdeTopic	STR	Topic name for a DDE connection. This string is written out only if the sbt equals one.
P2	strOleProgId	STR	ProgID for the ole collection. This string is written out only if the sbt equals two.

BRTEXTERNTABLESTART

Record 363, Size 5

This record represents the beginning of the external book's cell table. This collection expresses information about each cell, grouped together by rows in the worksheet.

Record data

Offset Field Name Size Contents

0	itab	4	Index of sheet in the external workbook that is referenced and partially cached in this data set.
4	grbit1	1	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fRefreshError	1	=1 if the last external data refresh for this sheet did not succeed.
1	unused	7	Reserved

BRTEXTERNTABLEEND

Record 364, Size 0

This record represents the end of the external book's cell table.

BRTEXTERNROWHDR

Record 366, Size 4

This record represents the start of a row.

Record data

Offset	Field Name	Size	Contents
0	rw	4	Row index

BRTEXTERNCELLBLANK

Record 367, Size 4

This record represents an empty cell.

Record data

Offset	Field Name	Size	Contents
0	col	4	The cell's column location

BRTEXTERNCELLREAL

Record 368, Size 12

This record represents a cell with a number.

Record data

Offset	Field Name	Size	Contents
0	col	4	The cell's column location
4	num	8	The value of the number in NUM format.

BRTEXTERNCELLBOOL

Record 369, Size 5

This record represents a cell with a Boolean (true/false) value.

Record data			
Offset	Field Name	Size	Contents
0	col	4	The cell's column location
4	fBool	1	Boolean value

BRTEXTERNCELLERROR

Record 370, Size 5

This record represents a cell with an error value.

Record data			
Offset	Field Name	Size	Contents
0	col	4	The cell's column location
4	bError	1	0= #NULL! (a null range reference) 7= #DIV0! (divide by zero) 15= #VALUE! (an invalid value) 23= #REF! (an invalid cell reference) 29= #NAME? (an unrecognized name/label) 36= #NUM! (an invalid number) 42= #N/A (no value available)

BRTEXTERNCELLSTRING

Record 371, Variable Size

This record represents a cell with a string

Record data			
Offset	Field Name	Size	Contents
0	col	4	The cell's column location
4	str	STR	The cell's string value

BRTEXTERNVALUENAME

Record 472, Size 4

Defines the index of the cell value's metadata block to be applied to the subsequent cell record.

Record data			
Offset	Field Name	Size	Contents
0	ivmb	4	Cell's value metadata block index

BRTSUPNAMESTART

Record 577, Variable Size

This record defines a collection of values associated with an External Book, DDE, or OLE item.

Record data			
Offset	Field Name	Size	Contents
0	strName	STR	The External Book, DDE, or OLE name

BRTSUPNAMEVALUESTART

Record 578, Size 8

This record defines the start of information for a value associated with an External Book, DDE, or OLE item.

Record data			
Offset	Field Name	Size	Contents
0	crw	4	The number of rows of data that will be returned by the server for this DDE item.
4	ccol	4	The number of columns of data that will be returned by the server for this item.

BRTSUPNAMEVALUEEND

Record 579, Size 0

This record defines the end of information for a value associated with an External Book, DDE, or OLE item.

BRTSUPNAMENUM

Record 580, Size 8

This record contains a NUM value associated with a particular External Book, DDE, or OLE item.

Record data			
Offset	Field Name	Size	Contents
0	num	8	The value of the number in NUM format.

BRTSUPNAMEERR

Record 581, Size 1

This record contains an error value associated with a particular External Book, DDE, or OLE item.

Record data**Offset Field Name Size Contents**

0	err	1	0= #NULL! (a null range reference) 7= #DIV0! (divide by zero) 15= #VALUE! (an invalid value) 23= #REF! (an invalid cell reference) 29= #NAME? (an unrecognized name/label) 36= #NUM! (an invalid number) 42= #N/A (no value available)
---	-----	---	--

BRTSUPNAMEST

Record 582, Variable Size

This record contains a string value associated with a particular External Book, DDE, or OLE item.

Record data**Offset Field Name Size Contents**

0	str	STR	String value
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BRTSUPNAMENIL

Record 583, Size 0

This record marks a nil value associated with a particular External Book, DDE, or OLE item.

BRTSUPNAMEBOOL

Record 584, Size 1

This record contains a Boolean value associated with a particular External Book, DDE, or OLE item.

Record data**Offset Field Name Size Contents**

0	f	4	Boolean value
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BRTSUPNAMEFMLA

Record 585, Variable Size

This record contains a formula value associated with a particular External Book, DDE, or OLE item.

Record data**Offset Field Name Size Contents**

0	FMLA	FMLA	Associated FMLA value
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BRTSUPNAMEBITS

Record 586, Size 9

This record represents an External Book, OLE, or DDE item.

Record data

Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	isheet	4	The index of the worksheet that the named range applies to for named ranges that are scoped to a particular worksheet rather than the full workbook.
8	fDde	1	=1 if this is a DDE item

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fBuiltIn	1	=1 if this name is built in
1	fWantAdvise	1	=1 if the DDE server should notify the application when the external data changes.
2	fWantPict	1	=1 if data from this DDE item is an image format.
3	fOLE	1	=1 if this is an OLE item.
4	fOLELink	1	=1 if the OLE object is linked.
5	fIcon	1	=1 if the object is represented by an icon.
6	unused	26	Reserved

BRTSUPNAMEEND

Record 587, Size 0

This record defines the end of a collection of values associated with an External Book, DDE, or OLE item.

BRTENDSSUPBOOK

Record 588, Size 0

This record is the end of a container for specific types of external links.

Comments Part

The comments part represents the collection of comments and comment authors for a particular sheet. A comment is a rich text note that is attached to & associated with a cell, separate from other cell content. Comment content is stored separate from the cell, and is displayed in a drawing object (like a text box) that is separate from, but associated with, a cell. Comments are used as reminders, such as noting how a complex formula works, or to provide feedback to other users. Comments can also be used to explain assumptions made in a formula or to call out something special about the cell.

RECORD ORDER

brtBeginComments [Record 628]

 brtBeginCommentAuthors [Record 630]

 brtCommentAuthor [Record 632] (occurs 0 or more times)

 brtEndCommentAuthors [Record 631]

 brtBeginCommentList [Record 633]

 brtBeginComment [Record 635] (occurs 0 or more times)

 brtCommentText [Record 637]

 brtEndComment [Record 636]

 brtEndCommentList [Record 634]

 brtEndComments [Record 629]

BRTBEGINCOMMENTS

Record 628, Size 0

The beginning of the root container of a set of comments and comment authors for a particular sheet. Each set of comments for a sheet is stored in a separate comments part. The relationship part for a sheet defines a link to the correct comment part for that sheet.

BRTENDCOMMENTS

Record 629, Size 0

The end of the root container of a set of comments and comment authors for a particular sheet.

BRTBEGINCOMMENTAUTHORS

Record 630, Size 0

The beginning of a container that holds a list of comment author names. There may be many comment authors per sheet, but each author name must be unique per sheet. The

information for each author is stored only once for that sheet. Comments refer to the author by zero-based index.

Note that there can be multiple lists of authors per workbook since each sheet contains its own comments part, and each comments part defines a list of authors for comments on that sheet.

BRTENDCOMMENTAUTHORS

Record 631, Size 0

The end of a container that holds a list of comment author names.

BRTCOMMENTAUTHOR

Record 632, Variable Size

Contains a string representing the name of a single author of comments. Every comment must have an author.

Record data

Offset	Field Name	Size	Contents
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0	strAuthor	STR	The string representing the name of a single author of comments. Every comment must have an author. The maximum length of the author string is an implementation detail, but a good guideline is 255 chars.
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BRTBEGINCOMMENTLIST

Record 633, Size 0

The beginning of a container that holds a list of comments for the sheet.

BRTENDCOMMENTLIST

Record 634, Size 0

The end of a container that holds a list of comments for the sheet.

BRTBEGINCOMMENT

Record 635, Size 36

The beginning of a container for a single user entered comment. Each comment shall have an author and can optionally contain richly formatted text.

Record data

Offset	Field Name	Size	Contents
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0	iauthor	4	A signed integer which is used as the zero-based index into the list of authors for this set of comments.
4	ref	16	A REF reference to the cell that the comment is associated with. May only reference a single cell, not a range of cells, since comments are on a per cell basis.
20	guid	16	Unique identifier for this comment. The attribute is unique across all comments in shared workbooks.

BRTENDCOMMENT

Record 636, Size 0

The end of a container for a single user entered comment.

BRTCOMMENTTEXT

Record 637, Variable Size

Contains rich text which represents the text of a comment. If the comment has no text, this record is not written out.

Record data

Offset	Field Name	Size	Contents
0	rstr	RICH STR	The rich text which represents the text of a comment. The maximum length for this text is a spreadsheet application implementation detail. A recommended guideline is 32767 chars. See the Strings part for more details.

User Names Part

The User Names stream will occur in any shared (revision-tracked) workbook. It contains information about each user, who currently has the workbook open, including the user name, when they opened the shared workbook, and the latest revision this user is synced to.

RECORD ORDER

`brtcUsr` [Record 399]

`brtBeginUsers` [Record 401]

`brtUsr` [Record 400] (occurs 0 to 255 times)

`brtEOF` [Record 403]

BRTCUSR

Record 399, Size 2

This record stores the number of unique users currently using the given shared workbook.

Record data			
Offset	Field Name	Size	Contents
0	cUsrSav	2	Number of users who currently have this shared workbook open (max: 255)

 Offset | Field Name | Size | Contents |

0	cUsrSav	2	Number of users who currently have this shared workbook open (max: 255)
---	---------	---	---

BRTUSR

Record 400, Variable Size

This record represents a user, and it stores information about a specific user as it relates to revisions.

Record data			
Offset	Field Name	Size	Contents

 Offset | Field Name | Size | Contents |

0	iUsrId	4	Unique user id (signed integer) for this user.
4	guid	16	A globally unique identifier identifying the last set of revisions that this user is synchronized to. This attribute can be used by the spreadsheet application to ensure that revisions this user depends on aren't deleted.
20	year	2	Year when the user opened this workbook
22	month	1	Month when the user opened this workbook
23	dom	1	Day of the month when the user opened this workbook
24	hr	1	Hour when the user opened this workbook
25	min	1	Minute when the user opened this workbook
26	sec	1	Second when the user opened this workbook

27	wdy	1	Day of the week (1-7 = Sunday – Saturday) when the user opened this workbook
28	strName	STR	Display name for this user. User name strings should not be longer than 54 characters.

BRTBEGINUSERS

Record 401, Size 0

This record represents the beginning of a list of users who currently have this shared workbook open. This list does not include any users who have the workbook open in Read-Only mode.

BRTEOF

Record 403, Size 0

This record represents the end of the user names stream.

Revision Headers Part

The revisions headers part contains the headers for all the changes that have taken place for this workbook. This part consists entirely of `BRTRRHEADER` records. The headers list when the changes were made, who made them, and the relationship IDs so that the log detailing the specific change can be found. If tracking changes, or sharing workbooks, are enabled, then changes are persisted on the Save event, or at a specified time interval. A header is created for each set of changes and a revision log part is written for this specific header.

BRTRRHEADER

Record 411, Variable Size

This record is essentially a table that contains metadata about a list of specific changes that have taken place for this workbook. It lists when the changes were made, who made them, and the relationship IDs so that the log detailing the specific change can be found.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. Only the <code>revt</code> field is used.
14	guid	16	A globally unique identifier for this set of revisions.
30	year	2	Year when this set of revisions was saved.
32	month	1	Month when this set of revisions was saved
33	dom	1	Day of the month when this set of revisions was saved
34	hr	1	Hour when this set of revisions was saved
35	min	1	Minute when this set of revisions was saved
36	sec	1	Second when this set of revisions was saved
37	wdy	1	Day of the week (1-7 = Sunday – Saturday) when the user opened this workbook
38	tabidMac	2	Next available sheet id.
40	revidMin	4	The lowest revision id that belongs to this header. Note: this can be used when, given a revision ID, the spreadsheet application needs to determine which revision log to access.
44	revidMax	4	The highest revision Id that belongs to this header. Note: this can be used when, given a revision ID, the spreadsheet application needs to determine which revision log to access.
P1	strUser	STR	A string representing the name of the user making the revision.
P2	strRelID	STR	Identifies the corresponding revisionLog# part that contains the changes for the set of revisions described by this header record.

P3 rgwtabid RG 2 A list of sheet ids that are used for tracking revision records. The first one is the id of the left-most sheet in the tab bar, followed by the second from the left, and so on.

P4 rgrevidAccepted RG 4 A list of reviewed revisions.

Revision Log Part

The Revision History stream will occur in any shared (revision-tracked) workbook. It contains the history of actions taken by each user, which allows other users to keep their versions of the workbook synchronized. The following are the only records that can legally be found in the Revision History stream. These records may not ever occur outside of the Revision History stream (unless otherwise indicated).

RECORD ORDER

All of the records within the revisions part can be written in any order. The following BEGIN/END pairings are the only sets of records that maintain a strict order:

BRTRRINSDEL:

brtRRInsDel [\[Record 405\]](#)

Followed by zero or more of the following records, in any order:

brtRRChgCell [\[Record 409\]](#)

brtRRFormat [\[Record 419\]](#)

brtEndRRInsDel [\[Record 406\]](#)

BRTRRINSMOVE:

brtRRMove [\[Record 407\]](#)

Followed by zero or more of the following records, in any order:

brtRRChgCell [\[Record 409\]](#)

brtRRFormat [\[Record 419\]](#)

brtEndRRMove [\[Record 408\]](#)

BRTRRCHGCELL:

brtRRChgCell [\[Record 409\]](#)

Zero or one of the following records:
(Optional old cell value)

brtCellBlank [\[Record 1\]](#)

brtCellRk [\[Record 2\]](#)

brtCellError [\[Record 3\]](#)

brtCellBool [\[Record 4\]](#)

brtCellReal [\[Record 5\]](#)

brtCellSt [\[Record 6\]](#)

brtCellIsst [\[Record 7\]](#)

brtFmlaString [\[Record 8\]](#)

brtFmlaNum [[Record 9](#)]
 brtFmlaBool [[Record 10](#)]
 brtFmlaError [[Record 11](#)]

One of the following records:
(Required new cell value)

brtCellBlank [[Record 1](#)]
 brtCellRk [[Record 2](#)]
 brtCellError [[Record 3](#)]
 brtCellBool [[Record 4](#)]
 brtCellReal [[Record 5](#)]
 brtCellSt [[Record 6](#)]
 brtCellIsst [[Record 7](#)]
 brtFmlaString [[Record 8](#)]
 brtFmlaNum [[Record 9](#)]
 brtFmlaBool [[Record 10](#)]
 brtFmlaError [[Record 11](#)]

brtDxf [[Record 507](#)] (Occurs 0 to 1 times. Old value. Optional.)

brtDxf [[Record 507](#)] (New value. Required.)

brtEndChgCell [[Record 410](#)]

BRTRRFORMAT:

brtRRFormat [[Record 419](#)]

brtDxf [[Record 507](#)] (Occurs 0 to 1 times)

brtEndRRFormat [[Record 420](#)]

RRD

Revision Record on Disk Structure

The majority of the records that follow will begin with a 14-byte RRD structure, which contains general information that may be applicable to any of the revision record types.

Record data				
Offset	Field Name	Size	Contents	
0	unused	4	Reserved	
4	revid	4	An integer representing the number of this revision. This id shall apply to reviewable revision types only.	

8	revt	2	Revision type. 0= Insert row 1= Insert column 2= Delete row 3= Delete column 4= Cell(s) move 5= Insert sheet 6= Delete sheet 8= Change cell 9= Rename sheet 10= Change defined name 11= Formatting revision 12= Auto formatting revision 13= Comment revision 32= Header (revision metadata) 37= Conflict 38= Formatting merge 43= Add custom view 44= Delete custome view 46= Remove QueryTableField
10	grbit1	2	See grbit1 description below.
12	tabid	2	An integer representing the internal id of the sheet on which the revision occurred. Any records that do not care about the tab id should set it to tabidNil (-1).

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fAccepted	1	=1 if this revision has been reviewed and accepted. An exception to this is that insert sheet revision records are always marked as accepted.
1	fUndoAction	1	=1 if this revision occurred because another revision was rejected and therefore undone.
2	fRedoAction	1	=1 if this revision was due to a previous undo revision being rejected.
3	fDelAtEdgeOfSort	1	=1 if a row or column is being deleted at the edge of a sorted range. Only applicable to a Delete Row/Column revision types.
4	unused	12	Reserved

BRTINFO

Record 398, Size 46

This record represents the start of the list of revision headers.

This section contains many references to history, versions, and revisions, and it is helpful to clarify the relationships here. In general, a series of changes (revisions) can be made to a spreadsheet. When a batch of those revisions is saved to disk, the version number of the spreadsheet is incremented. The batch of changes is saved to the revision history, which is persisted on disk with the file in the form of different log files and headers.

There are some attributes that deal with history which may seem redundant (such as `fRevHist` and `fRevTrack`, among others) - these are there for backwards compatibility with older versions of spreadsheet applications and do not need to be used for creating new files.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See <code>grbit1</code> description below.
2	guid	16	The globally unique identifier of the last set of revisions. This shall match the GUID for the most recent header.
18	guidRoot	16	Unique identifier of the last set of revisions that was saved into the file. The spreadsheet application may have certain modes, such as a timed save mode, where the application doesn't do a full save, but instead just appends the most recent revision records. In cases like this, for a new user that opens such a file while it is being edited, the file that was loaded from disk will only have the changes that were saved during a full save. To get the current state of the file which includes edits by other users, the spreadsheet application would need to apply all the revisions from <code>lastGuid</code> to <code>guid</code> .
34	revId	4	The current revision number of this shared workbook.
38	version	4	An integer representing the current version of this shared workbook. The integer should begin counting from 1 for the first version.
42	grbit2	2	See <code>grbit2</code> description below.
44	wRevHist Interval	2	An integer representing the number of days the spreadsheet application will keep the change history for this workbook.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fShared	1	=1 if this workbook is shared. This is used for backwards compatibility with older spreadsheet applications.
1	fDiskHasRev	1	=1 if this shared workbook file contains revisions. This attribute is used for backwards compatibility.
2	fRevHist	1	=1 if this shared workbook maintains a revision history. This is used for backwards compatibility with older spreadsheet applications.
3	fRevTrack	1	=1 if revisions are tracked in this shared workbook. This is used for backwards compatibility with older spreadsheet applications.
4	fExclusive	1	=1 if shared workbook is in exclusive mode. A workbook is in exclusive mode when a user has a lock on it for appending revisions to the file. This is used for backwards compatibility with older spreadsheet applications.
5	unused	11	Reserved

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fNoRevHist	1	=0 if the revision history should be kept for this shared workbook.
1	fProtRev	1	=0 if the change tracking in this shared workbook can be removed.
2	unused	14	Reserved

BRTEOF

Record 403, Size 0

This record indicates the end of the Revision stream.

BRTUCR

Record 404, Size 34

This record represents undo information for row/column deletion when there are functions in the spreadsheet that reference the deleted rows/columns. Also applicable for cell move revision types. Not applicable for insert revisions.

Record data

Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	refChanged	16	The REF range which was deleted that is referenced by the affected formula.
20	rw	4	Row of the cell whose formula referenced the deleted cell range. Used only if fLbl in grbit1 is false.
24	col	4	Column of the cell whose formula referenced the deleted cell range. Used only if fLbl in grbit1 is false.
28	tabid	2	Internal Id of the worksheet that contained the formula that referenced the deleted cell range. Used only if fLbl in grbit1 is false, or when the affected formula was part of a local (sheet-level) defined name.
P1	strLblName	STR	Identifies the named range that referenced the deleted cell range. This string is written only if fLbl in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	iptg	16	Index of the expression within the corresponding formula that was affected by this change.
16	ptg	8	Identifies the type of the expression that should be adjusted in the corresponding formula.
24	fLbl	1	Indicates that the expression affected by this Undo record was contained in a defined name.
25	fUseSh2	1	=1 if the affected expression was on a different sheet.
26	unused	6	Reserved

BRTRRINSDEL

Record 405, Size 31

This record represents a revision record of a row/column insert/delete action.

Record data

Offset	Field Name	Size	Contents
0	rrd	14	RRD subrecord. The revid, revt, tabid, fDelAtEdgeOFSort, fAccepted, fUndoAction, and fRedoAction fields are used in this instance.
14	grbit1	1	See grbit1 description below.
15	ref	16	A REF reference to the location of the rows/columns that were inserted or deleted.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fEndOfList	1	=1 if a row or a column is being inserted at the end of a list of data. List in this context does not mean table, rather it refers to the feature where the spreadsheet application automatically creates an internal structure for making data input more consistent on adjacent rows or columns. For instance, if 3 cells in a row are entered with the same format, then when entering data into the 4th adjacent cell, the spreadsheet application might automatically apply that same format. In this case, those cells are treated as a list.
1	unused	7	Reserved

BRTRRENDINSDEL

Record 406, Size 0

This record represents the end of a revision a row/column insert/delete action.

BRTRRMOVE

Record 407, Size 48

This record represents a revision on cell(s) that moved.

Record data

Offset	Field Name	Size	Contents
0	rrd	14	RRD subrecord. The revid, revt, tabid, fAccepted, fUndoAction, and fRedoAction fields are used in this instance.
14	refSrc	16	The original REF location of the cell(s) that were moved.
30	refDst	16	The new REF location of the cell(s) that were moved.
46	tabidSrc	2	A short integer representing the internal id of the sheet where the cell(s) originally resided.

BRTRRENDMOVE

Record 408, Size 0

This record represents the end of a revision on cell(s) that moved.

BRTRRCHGCELL

Record 409, Variable Size

Revision record corresponding to a cell change revision.

Record data

Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. The <code>revid</code> , <code>revt</code> , <code>tabid</code> , <code>fAccepted</code> , <code>fUndoAction</code> , and <code>fRedoAction</code> fields are used in this instance.
14	rw	4	Row location of the cell that was changed.
18	col	4	Column location of the cell that was changed.
22	grbit1	4	See <code>grbit1</code> description below.
26	unused	4	Reserved
P1	rgetxp	RG ETXP	Array of fonts being changed. This field is written out only if the array size is greater than zero. See description of <code>ETXP</code> below.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	vt	3	Value type – indicates the cell type of the new cell contents. 0= Nil 1= Rk number 2= IEEE number 3= String 4= Boolean or error value 5= Fmla
3	vtOld	3	Value type – indicates the cell type of the old cell contents. 0= Nil 1= Rk number 2= IEEE number 3= String 4= Boolean or error value 5= Fmla
6	f123Prefix	1	=1 if a single quote prefix is used. Single quote prefixes are used to cause a formula to be evaluated as a string.
7	f123PrefixOld	1	=1 if a single quote prefix was used on this cell previously. Single quote prefixes are used to cause a formula to be evaluated as a string.
8	fOldFmt	1	=1 if there is old formatting information available for this cell.

9	fOldFmtNull	1	=1 if the old DXF is null.
10	fXfDxf	1	=1 if the formatting change had an effect on the formatting of the entire row or column that this cell belongs to. (Only applicable for Undo operations).
11	fStyXfDxf	1	=1 if the formatting change for this cell affected the cell's style. (Only applicable for Undo operations)
12	fDxf	1	=1 if there was a differential formatting change for this cell.
13	fDxfNull	1	=1 if the new DXF is null.
14	fNewRw	1	=1 if this is a newly inserted row (Only applicable for Undo operations).
15	fNewCol	1	=1 if this is a newly inserted column (Only applicable for Undo operations).
16	ifmtDisp	8	Zero-based index of the number format (Fmt) record used by this cell format (XF).
24	fPhShow	1	=1 if this cell contains phonetic text.
25	fPhShowOld	1	=1 if there is old phonetic text information available.
26	fEOLFmlaUpdate	1	=1 if the formula used at the end of a list has been updated. List in this context does not mean table, rather it refers to the feature where the spreadsheet application automatically creates an internal structure for making data input more consistent on adjacent rows or columns. For instance, if 3 cells in a row are entered with the same format, then when entering data into the 4th adjacent cell, the spreadsheet application might automatically apply that same format. In this case, those cells are treated as a list.
27	unused	5	Reserved

Each `ETXP` structure contains the following fields:

Offset	Field Name	Size	Contents
0	strFontName	64	Font name; each character is two bytes and the first two bytes are the font length
64	twpHeight	4	Height of the font in twips
68	grbit2	4	See description below
72	bls	2	Font bold style; a number from 100 to 1000 (64h to 3E8h) that indicates the character weight ("boldness"). The default values are 190h for normal text and 2BCh for bold text.
74	sss	2	Font superscript/subscript: 00h= None 01h= Superscript 02h= Subscript
76	uls	1	Font underline style: 00h= None 01h= Single 02h= Double 21h= Single Accounting 22h= Double Accounting

77	bFamily	1	The font family this font belongs to. A font family is a set of fonts having common stroke width and serif characteristics. This is system level font information. The font name overrides when there are conflicting values.
		Value	Font Family
		0	Not applicable.
		1	Roman
		2	Swiss
		3	Modern
		4	Script
		5	Decorative
78	bCharset	1	Font character set assigned to display this run.
		0= Ansi	
		1= Default	
		2= Symbol	
		77= Mac	
		128= Japanese	
		129= Korean	
		130= Johab	
		134= GB2312	
		136= Chinese Big 5	
		161= Greek	
		162= Turkish	
		163= Vietnamese	
		177= Hebrew	
		178= Arabic	
		186= Baltic	
		204= Russian	
		222= Thai	
		238= East Europe	
		255= Oem	
79	unused	1	Reserved
80	icvCompat	4	Index to the color value for the font, used for backward compatibility
84	fntGroup	4	Font group
88	iFontScheme	4	Font scheme
		0= None	
		1= Major	
		2= Minor	
		-1 = Nil	
92	brtColor	8	Font color. See BRTCOLOR for structure.

BRTRRENDCHGCELL

Record 410, Size 0

End of the revision corresponding to a cell change revision.

BRTRRUSERVIEW

Record 412, Size 30

This record represents a revision of adding or removing a custom view to the workbook

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. Only the <code>revt</code> field is used in this instance.
14	guid	16	Unique identifier of this custom view

BRTRRRENSHEET

Record 413, Variable Size

This record represents a revision record tracking the renaming a sheet.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. The <code>revid</code> , <code>tabid</code> , <code>revt</code> , <code>fAccepted</code> , <code>fUndoAction</code> , and <code>fRedoAction</code> fields are used in this instance.
P1	strOldName	STR	A string representing the old sheet name. This string is written only if it is non-null.
P2	strNewName	STR	A string representing the new sheet name

BRTRRINSERTSH

Record 414, Variable Size

This record represents a revision of a sheet that was inserted.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. The <code>revid</code> , <code>tabid</code> , <code>revt</code> , <code>fAccepted</code> , <code>fUndoAction</code> , and <code>fRedoAction</code> fields are used in this instance.
14	itabPos	2	An integer representing the zero based position of the new sheet in the sheet tab bar.
16	strName	STR	The name of the new sheet.

BRTRRDEFNAME

Record 415, Variable Size

This record represents a revision record of a defined name change.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. The <code>revid</code> , <code>tabid</code> , <code>revt</code> , <code>fAccepted</code> , <code>fUndoAction</code> , and <code>fRedoAction</code> fields are used in this instance.
14	tabidLocal	2	An integer representing the id of the sheet to which this defined name belongs. This shall be used local defined names only.
16	grbit1	1	See grbit description below.

17	unused	2	Reserved
19	grbit2	4	See grbit2 description below.
23	unused	2	Reserved
25	grbit3	4	See grbit3 description below.
29	fgrp	4	New function group id.
33	fgrpOld	4	Old function group id.
P1	strname	STR	A string representing the name for this defined name.
P2	fmla	FMLA	The new formula for a defined name in this cell. This is only used for named cells.
P3	strCustommenu	STR	A string representing the new custom menu text. This string is written out only if fCustommenu in grbit2 is true.
P4	strDescription	STR	A string representing the new description text for the defined name. This string is written out only if fDescription in grbit2 is true.
P5	strHelptopic	STR	A string representing the new help topic text. This string is written out only if fHelptopic in grbit2 is true.
P6	strStatustext	STR	A string representing the new status bar text. This string is written out only if fStatustext in grbit2 is true.
P7	strComment	STR	A string representing a comment about the defined name. This comment can be shown by the spreadsheet application in a names management UI so that users have more information about what the defined name is used for. This string is written out only if fComment in grbit2 is true.
P8	fmlaOld	FMLA	The old formula for a defined name in this cell. This is only used for named cells.
P9	strCustommenuOld	STR	A string representing the old custom menu text. This string is written out only if fCustommenuOld in grbit3 is true.
P10	strDescriptionOld	STR	A string representing the old description text. This string is written out only if fDescriptionOld in grbit3 is true.
P11	strHelptopicOld	STR	A string representing the old help topic text. This string is written out only if fHelptopicOld in grbit3 is true.
P12	strStatustextOld	STR	A string representing the old status bar text. This string is written out only if fStatustextOld in grbit3 is true.
P13	strCommentOld	STR	A string representing the old comment about the defined name. This string is written out only if fCommentOld in grbit3 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fViewName	1	=1 if that this named range belongs to a custom view.
1	fBuiltIn	1	=1 if the affected name was a built in name
2	unused	6	Reserved

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fPli	1	=1 if the defined name contains additional data (Custom Menu, Description, etc.).
1	fFunc	1	=1 the defined name refers to a function.
2	fgrp	6	Represents the new function group id. Function group ids are used to help classify functions. For instance, functions in the same group can be searched or selected easily from the spreadsheet applications UI. =1 Financial =2 Date and Time =3 Math and Trig =4 Statistical =5 Lookup & Reference =6 Database =7 Text =8 Logical =9 Information =10 Commands =11 Customizing =12 Macro Control =13 DDE/External =14 Cube =15 Engineering =16 User Defined
8	chKey	8	Represents the new character for the keyboard shortcut.
16	fHidden	1	=1 if the named range is now hidden. Hidden refers to whether the defined name is of a 'hidden' type. This applies to things like a custom filter on a cell, it has a name, but is hidden and so is not visible in any name management UI.
17	fCustommenu	1	=1 if <code>strCustommenu</code> is saved after the fixed size portion of the record.
18	fDescription	1	=1 if <code>strDescription</code> is saved after the fixed size portion of the record.
19	fHelptopic	1	=1 if <code>strHelptopic</code> is saved after the fixed size portion of the record.
20	fStatustext	1	=1 if <code>strStatustext</code> is saved after the fixed size portion of the record.
21	unused	11	Reserved

The `grbit3` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fPliOld	1	=1 if the old name contains additional data (Custom Menu, Description, etc.).
1	fFunc	1	=1 if the old name was a function
2	fgrpOld	6	Represents the old function group id. See grbit2's fgrp for a description of function group ids.
8	chKeyOld	8	Represents the old character for the keyboard shortcut.
16	fHiddenOld	1	=1 if the named range is now hidden. Hidden refers to whether the defined name is of a 'hidden' type. This applies to things like a custom filter on a cell, it has a name, but is hidden and so is not visible in any name management UI.
17	fCustommenuOld	1	=1 if strCustommenuOld is saved after the fixed size portion of the record.
18	fDescriptionOld	1	=1 if strDescriptionOld is saved after the fixed size portion of the record.
19	fHelptopicOld	1	=1 if strHelptopicOld is saved after the fixed size portion of the record.
20	fStatustextOld	1	=1 if strStatustextOld is saved after the fixed size portion of the record.
21	unused	11	Reserved

BRTRRN NOTE

Record 416, Variable Size

This record represents a revision of a cell comment change.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	RRD subrecord. Only the tabid and revt fields are used in this instance.
14	rw	4	The row of the cell where the comment was changed.
18	col	4	The column of the cell where the comment was changed.
22	unused	2	Reserved
24	grbit1	2	See grbit1 description below.
26	guid	16	A globally unique identifier of this comment. Used to find the actual comment in the Comments part.
42	ichEnd	4	Length of the comment before this revision was made.
46	cchNote	4	Length of the comment text added in this revision.
P1	strAuthor	STR	A string representing the name of the author who changed this comment.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	unused	1	Reserved

1	fShow	1	=1 the user has set this comment to always be visible.
2	fOld	1	Used for backwards compatibility. =1 if the original comment was created by a legacy spreadsheet application.
3	unused	4	Reserved
7	fRowHidden	1	=1 if the comment belongs to a cell in a hidden row.
8	fColHidden	1	=1 if the comment belongs to a cell in a hidden column.
9	unused	7	Reserved

BRTRRCONFLICT

Record 417, Size 14

This record represents a resolution of a merge conflict.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. The <code>revid</code> , <code>tabid</code> , <code>revt</code> , <code>fUndoAction</code> , and <code>fRedoAction</code> fields are used in this instance.

BRTRRTQSIF

Record 418, Size 34

This record represents a query table field being removed

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. Only the <code>tabid</code> and <code>revt</code> fields are used in this instance.
14	ref	16	REF location of the affected query table.
30	dwFieldId	4	ID of the specific query table field that was removed.

BRTRRFORMAT

Record 419, Variable Size

This record represents revision information about a formatting change.

Record data			
Offset	Field Name	Size	Contents
0	rrd	14	<u>RRD</u> subrecord. Only the <code>tabid</code> and <code>revt</code> fields are used in this instance.
14	grbit1	1	See <code>grbit1</code> description below.
15	ich	4	An integer representing an index showing which character a string change starts at within the string in the cell.
19	cch	4	The number of characters that were affected by a string change, counting from start.

P1	sqref	SQREF	A series of REF ranges to which this formatting was applied.
----	-------	-------	--

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fXfDxf</code>	1	=1 if this formatting change had an affect on the formatting of an entire row or column that an affected cell(s) belongs to. (Only applicable for Undo operations)
1	<code>fXfDxfNull</code>	1	=1 if the formatting associated with this record is null
2	<code>fStyXfDxf</code>	1	=1 if this formatting change affected a cell's style. (Only applicable for Undo operations).
3	unused	5	Reserved

BRTRRENDFORMAT

Record 420, Size 0

This record represents the end of revision information about a formatting change.

BRTRRAUTOFMT

Record 421, Size 38

This record represents a revision record of auto formatting change information for a table.

Record data

Offset	Field Name	Size	Contents
0	<code>rrd</code>	14	RRD subrecord. Only the <code>tabid</code> and <code>revt</code> fields are used in this instance.
14	<code>itbl</code>	4	Identifies which legacy table autoformat to apply. See BRTBEGINQSI for more information.
18	<code>grbit1</code>	4	See <code>grbit1</code> description below.
22	<code>ref</code>	16	REF reference to the location where the formatting was applied.

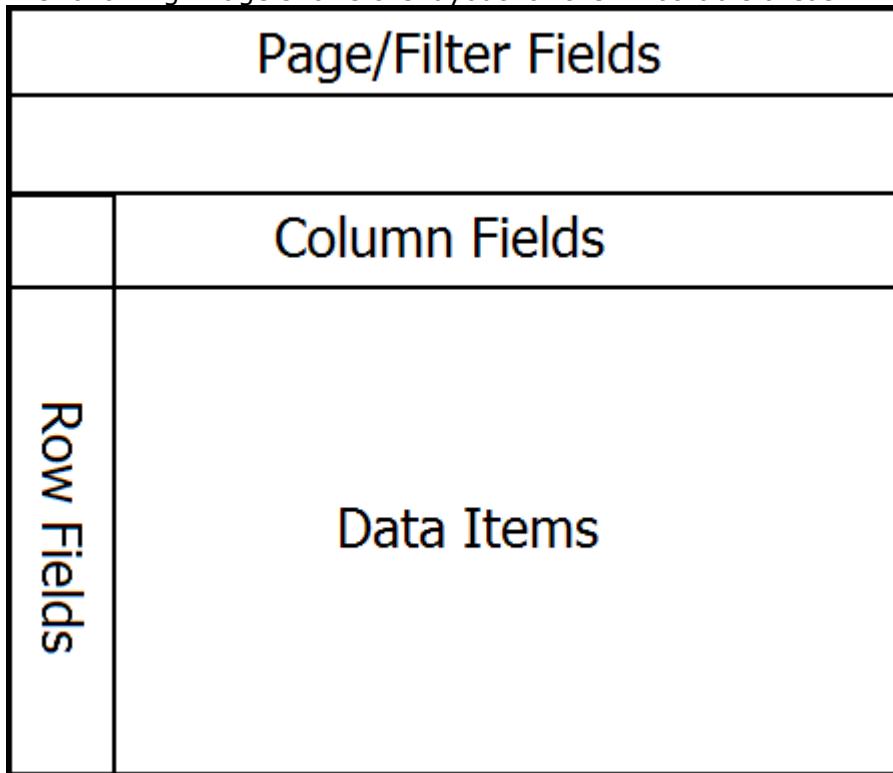
The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fAtrNum</code>	1	=1 if legacy table autoformat number format properties should be applied.
1	<code>fAtrFnt</code>	1	=1 if legacy table autoformat font format properties should be applied.
2	<code>fAtrAlc</code>	1	=1 if legacy table autoformat alignment properties should be applied.
3	<code>fAtrBdr</code>	1	=1 if legacy table autoformat border properties should be applied.
4	<code>fAtrPat</code>	1	=1 if legacy table autoformat pattern properties should be applied.
5	<code>fAtrWidth</code>	1	=1 if legacy table autoformat width/height properties should be applied.
6	unused	26	Reserved

PivotTable Part

PivotTables display aggregated views of data easily and in an understandable layout. Hundreds or thousands of pieces of underlying information can be aggregated on row & column axes, revealing the meanings behind the data. PivotTable reports are used to organize and summarize your data in different ways. Creating a PivotTable report is about moving pieces of information around to see how they fit together. In a few gestures the pivot rows and columns can be moved into different arrangements and layouts. A PivotTable object has a row axis area, a column axis area, a data area, and a page/report filter area. Additionally, PivotTables have a corresponding field list pane, or similar user interface, that displays all the fields of data that can be placed on one of the PivotTable areas. Each PivotTable area maps to a collection of fields in the PivotTableDefinition that correspond to each area.

The following image shows the layout for the PivotTable areas.



The following image shows a table of data in a worksheet.

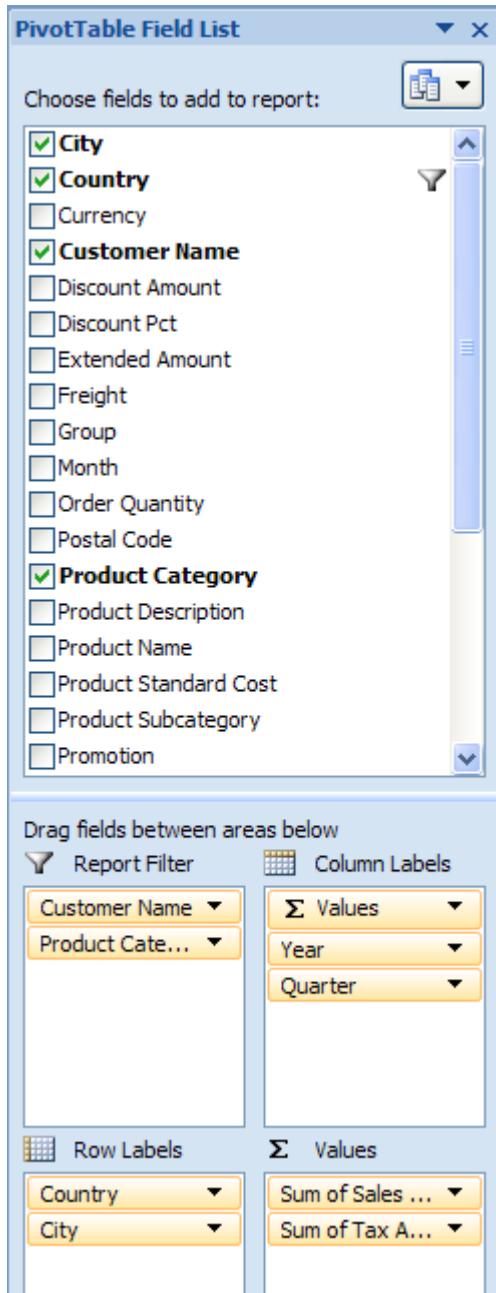
	A	C	F	H	I	O	P	Q	Z	AA	AB
1	Customer Name	Country	City	Product Category	Product Subcategory	Year	Quarter	Month	Sales Amount	Tax Amount	Freight
2	Michele Raman	Australia	Bendigo	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
3	Misty Raji	Australia	Bendigo	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568
4	Tabitha E Arthur	Australia	Bendigo	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568
5	Clarence D Rai	Australia	Bendigo	Bikes	Mountain Bikes	2001	3	July	3399.99	271.9992	84.9998
6	Jimmy L Moreno	Australia	Bendigo	Bikes	Mountain Bikes	2001	3	July	3399.99	271.9992	84.9998
7	Rob Verhoff	Australia	Bendigo	Bikes	Mountain Bikes	2001	3	July	3374.99	269.9992	84.3748
8	Levi Sai	Australia	Bendigo	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568
9	Logan Gonzales	Australia	Brisbane	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568
10	Dalton J Lee	Australia	Brisbane	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
11	Jessie J Ortega	Australia	Brisbane	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
12	Paul J. Shakespear	Australia	Caloundra	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
13	Joan R Martin	Australia	Caloundra	Bikes	Road Bikes	2001	3	September	699.0982	55.9279	17.4775
14	Casey Pal	Australia	Caloundra	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568
15	Ethan G Coleman	Australia	Caloundra	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
16	Kendra Rubio	Australia	Caloundra	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
17	Bethany G Yuan	Australia	Cloverdale	Bikes	Mountain Bikes	2001	3	August	3399.99	271.9992	84.9998
18	Jasmine Wilson	Australia	Coffs Hck	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
19	Micah Wu	Australia	Coffs Hck	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
20	Warren L Zhang	Australia	Coffs Hck	Bikes	Road Bikes	2001	3	July	699.0982	55.9279	17.4775
21	Ariana Stewart	Australia	Coffs Hck	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
22	Suzanne K Lu	Australia	Coffs Hck	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
23	Randall M Rubio	Australia	Cranbourn	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
24	Deborah K Kumar	Australia	Cranbourn	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
25	Krystal Holt	Australia	Cranbourn	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568
26	Patricia T Raman	Australia	Cranbourn	Bikes	Road Bikes	2001	3	August	3578.27	286.2616	89.4568
27	Wendy Dominguez	Australia	Cranbourn	Bikes	Mountain Bikes	2001	3	August	3374.99	269.9992	84.3748
28	Willie She	Australia	Darlinghu	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
29	Alan Zhu	Australia	Darlinghu	Bikes	Road Bikes	2001	3	September	3578.27	286.2616	89.4568
30	Dawn R Tang	Australia	Darlinghu	Bikes	Road Bikes	2001	3	July	3578.27	286.2616	89.4568

The following image shows a PivotTable summary of the worksheet table data.

	A	B	C	D	E	F	G
1							
2		Country (All)					
3		State (All)					
4		City (All)					
5							
6		Sum of Sales Amount	Column Labels				
7			2001				2001 Total
8				3			3 Total
9		Row Labels	July	August	September		
10		Bikes	209652.9046	222538.2892	173993.5128	606184.7066	606184.7066
11		Mountain Bikes	64424.81	60899.82	10174.97	135499.6	135499.6
12		Road Bikes	145228.0946	161638.4692	163818.5428	470685.1066	470685.1066
13		Grand Total	209652.9046	222538.2892	173993.5128	606184.7066	606184.7066

The filter area consists of the "Country", "State", and "City" fields. The row area consists of the "Product Category" and "Product Subcategory" fields. "Bikes" belongs to the "Product Category" field and both "Mountain Bikes" and "Road Bikes" belong to the "Product Subcategory" field. The column consists of the "Year" ("2001"), "Quarter" ("3"), and "Month" ("July", "August", and "September") fields.

The following image shows the field list for the PivotTable in the previous image.



FILE STRUCTURE

The workbook points to (and owns the longevity of) the *pivotCacheDefinition* part, which in turn points to and owns the *pivotCacheRecords* part. The workbook also points to and owns the sheet part, which in turn points to and owns a *pivotTable* part definition, when a PivotTable is on the sheet. There can be multiple PivotTables on a sheet. The *pivotTable* part points to the appropriate *pivotCacheDefinition* which it is using. Since multiple PivotTables can use the same cache, the *pivotTable* part does not own the longevity of the *pivotCacheDefinition*.

The *pivotTable* part describes the particulars of the layout of the PivotTable on the sheet. It indicates what fields are on the row axis, the column axis, report filter, and values areas of

the PivotTable. It also indicates formatting information about the PivotTable. If conditional formatting has been applied to the PivotTable, then that is also expressed in the *pivotTable* part.

RECORD ORDER

brtBeginSXVIEW [Record 280]

 brtBeginSxlocation [Record 314]

 brtEndSxlocation [Record 313]

 brtBeginSXVDs [Record 287]

 brtBeginSXVD [Record 285] (Occurs 1 or more times)

 brtBeginSXVI [Record 283] (Occurs 0 to 1 times)

 brtBeginSXVI [Record 282] (Occurs 1 or more times)

 brtEndSXVI [Record 281]

 brtEndSXVI [Record 284]

 brtBeginAutoSortScope [Record 459] (Occurs 0 to 1 times)

 <PRule Records>

 brtEndAutoSortScope [Record 460] (Occurs 0 to 1 times)

 brtEndSXVDs [Record 286]

 brtEndSXVD [Record 288]

 brtBeginIsxvdRws [Record 309] (Occurs 0 to 1 times)

 brtEndIsxvdRws [Record 310]

 brtBeginSXLIRws [Record 299] (Occurs 0 to 1 times)

 brtBeginSXLI [Record 297] (Occurs 1 or more times)

 brtBeginIsxvis [Record 283]

 brtEndSXVI [Record 284]

 brtEndSXLI [Record 298]

 brtEndSXLIRws [Record 300]

 brtBeginIsxvdCols [Record 311] (Occurs 0 to 1 times)

 brtEndIsxvdCols [Record 312]

 brtBeginSXLIRegs [Record 301] (Occurs 0 to 1 times)

 brtBeginSXLI [Record 297] (Occurs 1 or more times)

 brtBeginIsxvis [Record 283]

 brtEndSXVI [Record 284]

 brtEndSXLI [Record 298]

 brtEndSXLIRegs [Record 302]

 brtBeginSXPIs [Record 291] (Occurs 0 to 1 times)

 brtBeginSXPI [Record 289] (Occurs 1 or more times)

brtEndSXPI [Record 290]
brtEndSXPIs [Record 292]
brtBeginSXDI [Record 295] (Occurs 0 to 1 times)
 brtBeginSXDI [Record 293] (Occurs 1 or more times)
 brtEndSXDI [Record 294]
brtEndSXDI [Record 296]
brtBeginSXFORMATs [Record 305] (Occurs 0 to 1 times)
 brtBeginSXFORMAT [Record 303] (Occurs 1 or more times)
 <PivotRule Records>
 brtEndSXFORMAT [Record 304]
brtEndSXFORMATs [Record 306]
brtBeginSXCONDFMTs [Record 560] (Occurs 0 to 1 times)
 brtBeginSXCONDFMT [Record 558] (Occurs 1 or more times)
 <PivotRule Records>
 brtEndSXCONDFMT [Record 559]
brtEndSXCONDFMTs [Record 561]
brtBeginSXCRTFMTs [Record 483] (Occurs 0 to 1 times)
 brtBeginSXCRTFMT [Record 481] (Occurs 1 or more times)
 <PivotRule Records>
 brtEndSXCRTFMT [Record 482]
brtEndSXCRTFMTs [Record 484]
brtBeginSXTTHs [Record 328] (Occurs 0 to 1 times)
(Only valid for OLAP PivotTables)
 brtBeginSXTTH [Record 318] (Occurs 1 or more times)
 brtBeginSXTDMPs [Record 324] (Occurs 0 to 1 times)
 brtBeginSXTDmpOrder [Record 668] (Occurs 0 to 1 times)
 (Can't be used with brtBeginSXTDMP)
 brtBeginSXTDMP [Record 326] (Occurs 0 or more times)
 (Can't be used with brtBeginSXTDmpOrder)
 brtEndSXTDMP [Record 327]
 brtEndSXTDMPs [Record 325]
 brtBeginSXTHItems [Record 328] (Occurs 0 to 1 times)
 brtBeginSXTHItem [Record 330] (Occurs 1 or more times)
 brtEndSXTHItem [Record 331]
 brtEndSXTHItems [Record 329]
 brtEndSXTTHs [Record 319]
brtEndSXTTHs [Record 329]

brtTableStyleClient [Record 513] (Occurs 0 to 1 times)
 brtBeginSXFILTERs [Record 599] (Occurs 0 to 1 times)
 brtBeginSXFILTER [Record 601] (Occurs 1 or more times)
 brtBeginAFILTER [AutoFilter] (Occurs 0 to 1 times)
 brtBeginFilterColumn [AutoFilter] (Occurs 1 or more times)
 One of the following seven items:
 brtDynamicFilter [AutoFilter]
 brtTop10Filter [AutoFilter]
 brtColorFilter [AutoFilter]
 brtIconFilter [AutoFilter]
 brtDynamicFilter [AutoFilter]
 brtBeginFilters [AutoFilter]
 brtBeginCustomFilters [AutoFilter]
 If brtBeginFilters is used, then also:
 brtFilter [AutoFilter] (Occurs 1 or more times)
 brtAfilterDateGroupItem [AutoFilter] (Occurs 0 or
more times)
 (Only valid for date filtering)
 brtEndFilters [AutoFilter]
 If brtBeginCustomFilters is used, then also:
 brtCustomFilter [AutoFilter] (Occurs 1 to 2 times)
 brtEndCustomFilters [AutoFilter]
 brtEndFilterColumn [AutoFilter]
 brtEndAFILTER [AutoFilter]
 brtEndSXFILTER [Record 602] (Occurs 1 or more times)
 brtEndSXFILTERs [Record 600] (Occurs 0 to 1 times)
 brtBeginIsxthRws [Record 320] (Occurs 0 to 1 times)
 (Only valid for OLAP PivotTables)
 brtEndIsxhtRws [Record 321]
 brtBeginIsxthRws [Record 322] (Occurs 0 to 1 times)
 (Only valid for OLAP PivotTables)
 brtEndIsxhtRws [Record 323]
 brtEndSXVIEW [Record 315]

BRTBEGINSXVIEW

Record 280, Variable Size

Represents the PivotTable root element for non-null PivotTables. There exists one pivotTableDefinition for each PivotTableDefinition part. The PivotTable definition encompasses the following information:

- Structure
- Top-level attributes
- Location information
- Collection of fields
- Fields on the row axis
- Items on the row axis (specific values)
- Fields on the column axis
- Items on the column axis (specific values)
- Fields on the report filter region
- Fields in the values region
- Style information

Record data

Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	grbit2	4	See grbit2 description below.
8	grbit3	4	See grbit3 description below.
12	sxaxis4Data	1	=1 if the default orientation for fields in the data region is vertical. =0 if the default orientation for fields in the data region is horizontal.
13	cWrapPage	1	Specifies the number of page fields to display before starting another row or column.
14	bVerSxLastUpdated	1	Specifies the version of the application that last updated the PivotTable view. This attribute is application-dependent.
15	bVerSx UpdateableMin	1	Specifies the minimum version of the application required to update this PivotTable view. This attribute is application-dependent.
16	ipos4Data	4	Specifies the row/column position for the data field in the PivotTable. Used with sxaxis4Data.
20	itblAutoFmt	4	Identifies which legacy table autoformat to apply. See BRTBEGINQSI for more information.
24	dwCrtFmtId	4	Specifies the next chart formatting identifier to use on the PivotTable.
28	idCache	4	Specifies the identifier of the related PivotCache definition. This Id is listed in the pivotCaches collection in the workbook part.
P1	strName	STR	Specifies the PivotTable name.
P2	strData	STR	Specifies the name of the value area field header in the PivotTable. This caption is shown when the PivotTable when two or more fields are in the values area. This string is written out only if fDisplayData in grbit2 is true.
P3	strGrand	STR	Specifies the string to be displayed for grand totals. This string is written out only if fDisplayGrand in grbit2 is true.

P4	strErrorString	STR	Specifies the string to be displayed in cells that contain errors. This string is written out only if fEmptyDisplayErrorString in grbit3 is false.
P5	strNullString	STR	Specifies the string to be displayed in cells with no value. This string is written out only if fEmptyDisplayNullString in grbit3 is false.
P6	strPageField Style	STR	Specifies the name of the style to apply to each of the field item headers in the page area of the PivotTable. This string is written out only if fDisplayPageFieldStyle in grbit2 is true.
P7	strTableStyle	STR	Specifies the name of the style to apply to the main table area of the PivotTable. This string is written out only if fDisplayTableStyle in grbit2 is true.
P8	strVacateStyle	STR	Specifies the name of the style to apply to the cells left blank when a PivotTable shrinks during a refresh operation. This string is written out only if fDisplayVacateStyle in grbit2 is true.
P9	strTag	STR	Specifies a user-defined string that is associated with this PivotTable. This string is written out only if fDisplayTag in grbit2 is true.
P10	strColHdrName	STR	Specifies the string to be displayed in column header in compact mode. This attribute depends on whether the application implements a compact mode for displaying PivotTables in the user interface. This string is written out only if fUseColHdrName in grbit2 is true.
P11	strRwHdrName	STR	Specifies the string to be displayed in row header in compact mode. This string is written out only if fUseRowHdrName in grbit2 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	bVerSxMacro	8	Specifies the version of the application that created the cache. This attribute is application-dependent. For Excel one of the following: 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
8	fDisplayImmediateItems	1	=1 if item names will be displayed when adding a field onto a PivotTable that has no data fields.
9	fEnableDataEd	1	=1 to disable the alert for when the user overwrites values in the data area of the PivotTable. Also grants the user permission to edit data values that previously could not be changed.
10	fDisableFList	1	=1 if the field list or similar mechanism for selecting fields in the user interface is disabled.

11	fReenterOnLoadOnce	1	Repopulate the pivot table and the cell during load
12	fNotViewCalculatedMembers	1	This attribute applies to PivotTables from OLAP-sources only. =0 if calculated members should be shown
13	fNotVisualTotals	1	This attribute applies to OLAP PivotTables only. =0 if subtotals will be computed on visible data only. =1 if subtotals will be computed on all data.
14	fPageMultipleItemLabel	1	This attribute applies only to non-OLAP PivotTables. The messages displayed depend on the application implementation. =1 if "multiple items" will be displayed for a page field with multiple items. =0 if "All" will be displayed for all page fields.
15	unused	1	Reserved
16	fHideDDData	1	=1 if the drop-down lists for the fields in the PivotTable should be hidden. This attribute depends on whether the application implements drop down lists or similar mechanism in the user interface. =1 if indicates drop down lists will be displayed for fields.
17	unused	3	Reserved
20	fHideDrillIndicators	1	=1 if drill indicators will not be displayed.
21	fPrintDrillIndicators	1	=1 if drill indicators should be printed.
22	fMemPropsInTips	1	=1 if member property information will be included in PivotTable tooltips. This attribute depends on whether the application employs tooltips or similar mechanism in the user interface.
23	fNoPivotTips	1	=1 if tooltips should not be displayed for PivotTable data cells. This attribute depends on whether the application employs tooltips or similar mechanism in the user interface.
24	cIndentInc	7	Specifies the indentation increment for compact axis and can be used to set the Report Layout to Compact Form.
31	fNoHeaders	1	=0 if field headers will be shown in the PivotTable. =1 if field headers will be excluded.

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fNoStencil	1	=0 if the PivotTable will display large drop zones when there are no fields in the data region. =1 if the large drop zones will not be displayed.
1	fHideTotAnnotation	1	=1 if an asterisk (*) is displayed next to each subtotal and grand total value in the specified PivotTable report if the report is based on an OLAP data source.
2	fIncludeEmptyRw	1	=1 if indicates empty rows will be included in the PivotTable.
3	fIncludeEmptyCol	1	=1 if empty columns will be included in the PivotTable.
4	fEnableWizard	1	=1 if the user may display the PivotTable wizard. This attribute depends on whether the application exposes a wizard or similar mechanism for creating and working with PivotTables in the user interface.
5	fEnableDrilldown	1	=1 if the user can drill down on a pivot item or aggregate value.
6	fEnableFieldDialog	1	=1 if the user can display pivot field properties. This attribute depends on how pivot field properties are exposed in the application user interface.
7	fPreserveFormatting	1	=1 if the formatting applied by the user to the PivotTable cells is preserved on refresh.
8	fAutoFormat	1	=1 if legacy autoformatting has been applied to the PivotTable view
9	fDisplayErrorString	1	=1 if error messages will be shown in cells. =0 if error messages will be shown through another mechanism the application provides in the user interface.
10	fDisplayNullString	1	=1 if a message string will be shown in cells without values.
11	fAcrossPageLay	1	How the page fields are laid out when there are multiple PivotFields in the page area. =1 if the fields will display "Over, then down" =0 if the fields will display "Down, then over"
12	fSubtotalHiddenPageItems	1	=1 if data for hidden pivot items for PivotFields in the data area will be included in subtotals.
13	fRwGrand	1	=1 if grand totals will be displayed for the PivotTable rows.
14	fColGrand	1	=1 if grand totals will be displayed for the PivotTable columns.

15	fPrintTitles	1	=1 if row and column titles from the PivotTable should be printed.
16	unused	1	Reserved
17	fRepeatItemsOnEach PrintedPage	1	=1 if pivotItem names should be repeated at the top of each page.
18	fMergeLabels	1	=1 if row or column titles that span multiple cells will be merged into a single cell.
19	fDisplayData	1	=1 if strData is saved after the fixed size portion of the record
20	fDisplayGrand	1	=1 if strGrand is saved after the fixed size portion of the record
21	fDisplayPageFieldStyle	1	=1 if strPageFieldStyle is saved after the fixed size portion of the record
22	fDisplayTableStyle	1	=1 if strTableStyle is saved after the fixed size portion of the record
23	fDisplayVacateStyle	1	=1 if strVacateStyle is saved after the fixed size portion of the record
24	fApplyNumberFormats	1	If true apply legacy table autoformat number format properties.
25	fApplyFontFormats	1	=1 if legacy table font properties are applied.
26	fApplyAlignmentFormats	1	=1 if legacy table autoformat alignment properties are applied.
27	fApplyBorderFormats	1	=1 if legacy table autoformat border properties are applied.
28	fApplypatternFormats	1	=1 if legacy table autoformat pattern properties are applied.
29	fApplyWidthHeightFormats	1	=1 if legacy table autoformat width/height properties are applied.
30	fDisplayTag	1	=1 if strTag is saved after the fixed size portion of the record
31	unused	1	Reserved

The grbit3 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDefaultCompact	1	=1 if new fields should default to compact mode equal to true. This attribute depends on whether the application implements a compact mode in the user interface.
1	fDefaultOutline	1	=1 if new fields will be created with outline equal to true.
2	fOutlineData	1	=1 if data fields in the PivotTable will display in outline form.
3	fCompactData	1	=1 if the field next to the data field in the PivotTable should be displayed in the same column of the spreadsheet
4	fNewDropZones	1	=0 if in-grid drop zones should not be enabled. This attribute depends on how the application implements drop zones in the user interface.

5	fNotPublished	1	=1 if data fields in the PivotTable are not published.
6	fEmptyDisplay ErrorString	1	=1 if strErrorString is null and should not be written out
7	fEmptyDisplay NullString	1	=1 if strNullString is null and should not be written out
8	fTurnOff Immersive	1	=1 if the PivotTable immersive experience should be turned off for this PivotTable. This attribute depends on whether the application implements an immersive experience in the user interface.
9	fSingleFilter PerField	1	=0 if the fields of a PivotTable can have multiple filters. =1 if the fields of a PivotTable can only have a simple filter.
10	fUseRwHdrName	1	=1 if strRwHdrName is saved after the fixed size portion of the record
11	fUseColHdrName	1	=1 if strColHdrName is saved after the fixed size portion of the record
12	fNonDefaultSort InFieldList	1	=1 if fields for the PivotTable are sorted in the field list. The sort order from the data source is applied for range-based PivotTables. Alphabetical sorting is applied for external data PivotTables.
13	unused	1	Reserved
14	fDontUse CustomLists	1	=1 if the "custom lists" option is not offered when sorting this PivotTable. This attribute depends on the implementation of sorting features in the application.
15	unused	17	Reserved

BRTENDSXVI

Record 281, Size 0

Specifies the end of the item in the PivotTable field.

BRTBEGINSXVI

Record 282, Variable Size

Specifies the beginning of the item in the PivotTable field.

Record data			
Offset	Field Name	Size	Contents
0	itmtype	1	Specifies the type of the item. Value of 'default' indicates a grand total as the last row item value. 1= DEFAULT 2= SUM 3= COUNTA 4= AVERAGE 5= MAX 6= MIN 7= PRODUCT 8= COUNT 9= STDEV 10= STDEVP 11= VAR 12= VARP
1	grbit1	2	See grbit1 description below.
3	iCache	4	Specifies the index to a pivotField item value. There will be as many x elements as there are item values in any particular column.
P1	strName	STR	Specifies the user caption of the item. This string is written out only if fDisplayName in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fHidden	1	=1 if item is hidden.
1	fHideDetail	1	=1 if item details are hidden.
2	fFormula	1	=1 if this item is a calculated member.
3	fMissing	1	=1 if the item value is missing. The application should still retain the item settings in case the item reappears during a later refresh.
4	fDisplayName	1	=1 if strName is saved after the fixed size portion of the record
5	fDrilledMember	1	=1 if this item has been expanded.
6	fHasChildrenEst	1	=1 if the approximate number of child items for this item is greater than zero.
7	fCollapsed Member	1	=1 if there is not a drill across attribute hierarchies positioned next to each other on a pivot axis.
8	fOlapFilter Selected	1	=1 if the item is included if the corresponding hierarchy is inclusive mode, or excluded if the corresponding hierarchy is exclusive mode for manual filtering
9	unused	7	Reserved

BRTBEGINSXVIS

Record 283, Size 4

Represents the collection of items in a PivotTable field. The items in the collection are ordered by index. Items represent the unique entries from the field in the source data.

Record data			
Offset	Field Name	Size	Contents
0	csxvis	4	Specifies the number of fields in the PivotTable.

BRTENDSXVIS

Record 284, Size 0

Represents the end of the collection of items in a PivotTable field.

BRTBEGINSXVD

Record 285, Variable Size

Represents a single field in the PivotTable. This complex type contains information about the field, including the collection of items in the field.

Record data			
Offset	Field Name	Size	Contents
0	sxaxis	1	Specifies the region of the PivotTable that this field is displayed. 0= None 1= Row 2= Column 4= Page/Filter area 8= Data
1	grbit1	2	See grbit1 description below.
3	grbit2	1	See grbit2 description below.
4	ifmt	4	Specifies the identifier of the number format to apply to this field. Number formats are written in the STYLES part.
Note: Formatting information provided by cell table and by PivotTable need not agree. If the two formats differ, the cell-level formatting takes precedence. If you change the layout the PivotTable, the PivotTable formatting will then take precedence.			
8	grbit3	2	See grbit3 description below.
10	grbit4	2	See grbit4 description below.
12	citmAutoShow	4	Specifies the number of items showed per page in the PivotTable.
16	isxdiautoShow	4	Specifies the index of the data field by which AutoShow will rank.
P1	strName	STR	Specifies the name of the field. This string is written out only if fDisplayName in grbit2 is true.
P2	strSub	STR	Specifies the custom text that is displayed for the subtotals label. This string is written out only if fDisplaySub in grbit2 is true.

P3	strMember Property CaptionUnique	STR	Specifies the unique name of the member property to be used as a caption for the field and field items. This string is written out only if fUseMemPropCaption in grbit2 is true.
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The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDefault	1	=1 if the default subtotal aggregation function is displayed for this field.
1	fSum	1	=1 if the 'sum' aggregation function will be applied in the subtotal of this field. =0 if another aggregation function will be applied in the subtotal of this field.
2	fCountA	1	=1 if the subtotal for this field is 'countA.' =0 if a different aggregation function is applied to the subtotal for this field.
3	fAverage	1	=1 if the subtotal for this field is 'Average.' =0 if a different aggregation function is applied to the subtotal for this field.
4	fMax	1	=1 if the 'max' aggregation function is applied in the subtotal for this field. =0 if another aggregation function is applied in the subtotal for this field.
5	fMin	1	=1 if the 'min' aggregation function is applied in the subtotal for this field. =0 if another aggregation function is applied in the subtotal for this field.
6	fProduct	1	=1 if the 'product' aggregation function is applied in the subtotal for this field. =0 if another aggregation function is applied in the subtotal for this field.
7	fCount	1	=1 if the subtotal for this field is 'count.' =0 if a different aggregation function is applied to the subtotal for this field.
8	fStdev	1	=1 if the 'stdDev' aggregation function is applied in the subtotal for this field. =0 if another aggregation function is applied in the subtotal for this field.
9	fStddevp	1	=1 if the 'stdDevP' aggregation function is applied in the subtotal for this field. =0 if another aggregation function is applied in the subtotal for this field.
10	fVar	1	=1 if the 'variance' aggregation function will be applied in the subtotal of this field. =0 if aggregation function will be applied in the subtotal of this field.
11	fVarp	1	=1 if the 'varP' aggregation function will be applied in the subtotal of this field. =0 if another aggregation function will be applied in the subtotal of this field.
12	unused	4	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDrilledLevel	1	Applies only to OLAP PivotTables. =1 if all items in the field are expanded. =0 if all items are not expanded. However some items may be expanded.
1	fHideDD	1	This attribute depends on the application implementation for filtering in the user interface. =0 if the application will display some mechanism for selecting and applying filters--for example, a dropdown menu--in the user interface. =1 if the mechanism for applying a filter will not be displayed in the user interface.
2	fHiddenLvl	1	This attribute applies to OLAP-based PivotTables only. =1 if the OLAP PivotTable contains a hidden level.
3	fUseMemProp Caption	1	=1 if strMemberPropertyCaptionUnique is saved after the fixed size portion of the record
4	fCompact	1	=1 if the next field should be displayed in the same column of the sheet if possible. =0 if the next pivot field will display in the next column in the sheet.
5	fDisplayName	1	=1 if strName is saved after the fixed size portion of the record
6	fDisplaySub	1	=1 if strSub is saved after the fixed size portion of the record
7	fTensorSort	1	=1 if this field is sorted in the data source.

The grbit3 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDragToRow	1	=1 if the field can be dragged to the row axis.
1	fDragToColumn	1	=1 if the field can be dragged to the column axis.
2	fDragToPage	1	=1 if the field can be dragged to the page region.
3	fDragToHide	1	=1 if the field can be removed from the PivotTable.
4	fDragToDate	1	=1 if the field can be dragged to the data region.
5	fShowAllItems	1	=1 if all items will be shown. =0 if items will be shown according to user specified criteria.
6	fOutline	1	=1 if new levels added to the PivotTable are shown in Outline mode.
7	fInsertBlankRow	1	=1 if a blank row will be inserted after each item.
8	fSubtotalAtTop	1	Applies only when Outline its true. =1 if indicates a subtotal will be display at the top of the group.
9	fServerBased	1	=1 if this is a server-based page field.
10	unused	1	Reserved

11	fPageBreaks BetweenItems	1	=1 if a page break will be inserted after each item.
12	fAutoSort	1	=1 if the auto sort is applied to this field
13	fAscendSort	1	=1 if the sort is in ascend/descend mode. Used only if fAutoSort is true
14	fAutoShow	1	This attribute depends on the implementation of filtering in the application. =1 if an "AutoShow" filter is applied to the field. This is an old style (Excel 2003 field filter) style filter.
15	fTopAutoShow	1	=1 if an AutoShow filter applied to this field will show top values for this field. Valid only if fAutoShow is true. =0 if bottom ranked values will be shown.

The grbit4 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fHideNewItems	1	=1 if items that appear after a refresh should be hidden by default.
1	fFilterInclusive	1	=1 if the manual filter is inclusive.
2	fHasAdvFilter	1	=1 if the field has a measure-based filter.
3	fEnableMultiple PageItems	1	=1 if the PivotTable can have multiple items selected in the page field. This attribute depends on the application support for selecting multiple items in page fields.
4	fNotAutoSortDft	1	=1 if an AutoSort operation will be applied to the field. =0 if a simple data sort operation will be applied to the field.
5	fMemProp DisplayInReport	1	=1 if the property value will be shown in a PivotTable cell.
6	fMemProp DisplayInTip	1	=1 if the property value will be shown in a tooltip in the user interface. This attribute depends on whether the application employs tooltips or similar mechanism in the user interface.
7	fMemPropDisplay InCaption	1	=1 if the property will be shown as a member caption.
8	fItemsDrilledBy Default	1	=1 if the attribute hierarchy is expanded. This attribute is designed to allow the application to issue more optimized queries when all items of each field have the same drill state.
9	unused	7	Reserved

BRTENDSXVD

Record 286, Size 0

Represents the end of a single field in the PivotTable. This complex type contains information about the field, including the collection of items in the field.

BRTBEGINSXVDS

Record 287, Size 4

Represents the collection of fields that appear on the PivotTable.

Record data**Offset Field Name Size Contents**

0	csxvds	4	Specifies the number of fields in the PivotTable.
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BRTENDSXVDS

Record 288, Size 0

Represents the end of the collection of fields that appear on the PivotTable.

BRTBEGINSXPI

Record 289, Variable Size

Represents a field on the page or report filter of the PivotTable.

Record data**Offset Field Name Size Contents**

0	isxvd	4	Specifies the index of the field that appears on the page or filter report area of the PivotTable.
4	isxvi	4	Specifies the index of the item in the PivotCache.
8	isxth	4	Specifies the index of the OLAP hierarchy to which this item belongs.
12	grbit1	1	See grbit1 description below.
P1	strUnique	STR	Specifies the unique name of the hierarchy. This string is written out only if fUnique in grbit1 is true.
P2	strDisplay	STR	Specifies the display name of the hierarchy. This string is written out only if fDisplay in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fUnique	1	=1 if strUnique is saved after the fixed size portion of the record
1	fDisplay	1	=1 if strDisplay is saved after the fixed size portion of the record
2	unused	6	Reserved

BRTENDSXPI

Record 290, Size 0

Represents the end of a field on the page or report filter of the PivotTable.

BRTBEGINSXPI

Record 291, Size 4

Represents the collection of items in the page or report filter region of the PivotTable.

Record data			
Offset	Field Name	Size	Contents
0	csxpis	4	Specifies the number of items in the page region of the PivotTable.

BRTENDSXPI

Record 292, Size 0

Represents the end of the collection of items in the page or report filter region of the PivotTable.

BRTBEGINSXDI

Record 293, Variable Size

Represents a field from a source list, table, or database that contains data that is summarized in a PivotTable in a data field. A data field represents data that's derived from a field in the source list or database. The Sport field, for example, might come from a column in the source list that's labeled Sport and contains the names of various sports (Golf, Tennis) for which the source list has sales figures. Source data can be taken from a list or range, an external database or cube, or another PivotTable. Data fields use summary functions to combine values from the underlying source data. You can also use custom calculations to compare data values, or add your own formulas that use elements of the report or other worksheet data.

Record data			
Offset	Field Name	Size	Contents
0	isxvdData	4	Specifies the index to the field in the pivotCacheRecords part that this data item summarizes.
4	iiftab	4	Specifies the aggregation function that applies to this data field.
8	df	4	Specifies the display format for this data field.
Note: Formatting information provided by cell table and by PivotTable need not agree. If the two formats differ, the cell-level formatting takes precedence. If you change the layout the PivotTable, the PivotTable formatting will then take precedence.			
0= Normal 1= Difference from 2= Percent of 3= Percent difference from 4= Running total in 5= Percent of row 6= Percent of column 7= Percent of total 8= Index			
12	isxvd	4	Specifies the index to the base field when the ShowDataAs calculation is in use.

16	isxvi	4	Specifies the index to the base item when the ShowDataAs calculation is in use.
20	ifmt	4	Specifies the index to the number format applied to this data field. Number formats are written to the styles part. See the Styles section for more information on number formats.
Note: Formatting information provided by cell table and by PivotTable need not agree. If the two formats differ, the cell-level formatting takes precedence. If you change the layout the PivotTable, the PivotTable formatting will then take precedence.			
24	grbit1	1	See grbit1 description below.
P1	strName	STR	Specifies the name of the data field. This string is written out only if fDisplayName in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDisplayName	1	=1 if strName is saved after the fixed size portion of the record
1	unused	7	Reserved

BRTENDSXDI

Record 294, Size 0

Represents the end of a field from a source list, table, or database that contains data that is summarized in a PivotTable.

BRTBEGINSXDIS

Record 295, Size 4

Represents the collection of items in the data region of the PivotTable.

Record data

Offset	Field Name	Size	Contents
0	csxdis	4	Specifies the number of items in the data region of the PivotTable.

BRTENDSXDIS

Record 296, Size 0

Represents the collection of items in the data region of the PivotTable.

BRTBEGINSXLI / COL

Record 297, Size 12

Represents the item in a column region of the PivotTable.

Record data

Offset	Field Name	Size	Contents
0	cSic	2	Specifies the number of items to repeat from the previous column item.
2	itmtype	2	Specifies the type of the item. Value of 'default' indicates a grand total as the last row item value 1= DEFAULT 2= SUM 3= COUNTA 4= AVERAGE 5= MAX 6= MIN 7= PRODUCT 8= COUNT 9= STDEV 10= STDEVP 11= VAR 12= VARP
4	cisxvis	4	Number of items not duplicated from the previous column
8	iData	4	Specifies a zero-based index indicating the referenced data item it in a data field with multiple data items that are not duplicated from the previous column.

BRTBEGINSXLI / RW

Record 297, Size 12

Represents the item in a row region of the PivotTable.

Record data

Offset	Field Name	Size	Contents
0	cSic	2	Specifies the number of items to repeat from the previous row item.
2	itmtype	2	Specifies the type of the item. Value of 'default' indicates a grand total as the last row item value 1= DEFAULT 2= SUM 3= COUNTA 4= AVERAGE 5= MAX 6= MIN 7= PRODUCT 8= COUNT 9= STDEV 10= STDEVP 11= VAR 12= VARP
4	cisxvis	4	Number of items not duplicated from the previous row
8	iData	4	Specifies a zero-based index indicating the referenced data item it in a data field with multiple data items that are not duplicated from the previous row.

BRTENDSXLI

Record 298, Size 0

Represents the end of the item in a row or column region of the PivotTable.

BRTBEGINSXLIRWS

Record 299, Size 4

Represents the collection of items in row axis of the PivotTable.

Record data**Offset Field Name Size Contents**

0	csxlis	4	Specifies the number of items in the row axis of the PivotTable.
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BRTENDSXLRWS

Record 300, Size 0

Represents the end of the collection of items in row axis of the PivotTable.

BRTBEGINSXLICOLS

Record 301, Size 4

Represents the collection of column items of the PivotTable.

Record data**Offset Field Name Size Contents**

0	csxlis	4	Specifies the number of items on the column axis of the PivotTable.
---	--------	---	---

BRTENDSXLCOLS

Record 302, Size 0

Represents the end of the collection of column items of the PivotTable.

BRTBEGINSXFORMAT

Record 303, Size 6

Represents the format defined in the PivotTable.

Record data**Offset Field Name Size Contents**

0	grbit1	2	See grbit1 description below.
---	--------	---	-------------------------------

2	dxfid	4	Specifies the identifier of the format the application is currently using for the PivotTable. Formatting information is written to the styles part. See the Styles section for more information on formats.
---	-------	---	---

Note: Formatting information provided by cell table and by PivotTable need not agree. If the two formats differ, the cell-level formatting takes precedence. If you change the layout the PivotTable, the PivotTable formatting will then take precedence.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	r1Type	2	<p>Specifies the formatting behavior for the area indicated in the pivotArea element. The default value for this attribute is "formatting," which indicates that the specified cells have some formatting applied. The format is specified in the dxfId attribute. If the formatting is cleared from the cells, then the value of this attribute becomes "blank."</p> <p>0= Blank 1= Format 2= Drill 3= Formula</p>
2	unused	14	Reserved

BRTENDSXFORMAT

Record 304, Size 0

Represents the end of the format defined in the PivotTable.

BRTBEGINSXFORMATS

Record 305, Size 4

Represents the collection of formats applied to PivotTable.

Record data

Offset	Field Name	Size	Contents
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0	csxformats	4	Specifies the number of formats in the collection.
---	------------	---	--

BRTENDSXFORMATS

Record 306, Size 0

Represents the end of the collection of formats applied to PivotTable.

BRTBEGINISXVDRWS

Record 309, Variable Size

Represents the collection of row fields for the PivotTable.

Record data			
Offset	Field Name	Size	Contents
0	rgisxvd	RG 4	Specifies an array of indices to a pivotField item value.

BRTENDISXVDRWS

Record 310, Size 0

Represents the end of the collection of row fields for the PivotTable.

BRTBEGINISXVDCOLS

Record 311, Variable Size

Represents the collection of fields that are on the column axis of the PivotTable.

Record data			
Offset	Field Name	Size	Contents
0	rgisxvd	RG 4	Specifies an array of indices to a pivotField item value.

BRTENDISXVDCOLS

Record 312, Size 0

Represents the end of the collection of fields that are on the column axis of the PivotTable.

BRTENDSXLOCATION

Record 313, Size 0

Represents the end of location information for the PivotTable.

BRTBEGINSXLOCATION

Record 314, Size 36

Represents location information for the PivotTable.

Record data			
Offset	Field Name	Size	Contents
0	rwFirst	4	Specifies the first row of the PivotTable.
4	rwLast	4	Specifies the last row of the PivotTable.
8	colFirst	4	Specifies the first column of the PivotTable.
12	colLast	4	Specifies the last column of the PivotTable.
16	rwFirstHead	4	Specifies the first row of the PivotTable header, relative to the top left cell in the ref value.
20	rwFirstData	4	Specifies the first row of the PivotTable data, relative to the top left cell in the ref value.
24	colFirstData	4	Specifies the first column of the PivotTable data, relative to the top left cell in the ref value.

28	crwPage	4	Specifies the number of rows per page for this PivotTable that the filter area will occupy. By default there is a single column of filter fields per page and the fields occupy as many rows as there are fields.
32	ccolPage	4	Specifies the number of columns per page for this PivotTable that the filter area will occupy. By default there is a single column of filter fields per page and the fields occupy as many rows as there are fields.

BRTENDSXVIEW

Record 315, Size 0

Represents the end of the PivotTable root element for non-null PivotTables.

BRTBEGINSXTHS

Record 316, Size 4

Represents the collection of OLAP hierarchies associated with the PivotTable.

Record data

Offset Field Name Size Contents

0	csxth	4	Specifies the number of OLAP hierarchies in the collection.
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BRTENDSXTHS

Record 317, Size 0

Represents the end of the collection of OLAP hierarchies associated with the PivotTable.

BRTBEGINSXTH

Record 318, Variable Size

Represents a OLAP hierarchy associated with the PivotTable. A hierarchy is a hierarchical representation of related OLAP dimensions. Hierarchies are defined on the OLAP server and cannot be changed in the PivotTable. For example, hierarchy "A" might be defined as follows:

Level 1	Country/Region
Level 2	State\Provence
Level 3	City

Record data

Offset Field Name Size Contents

0	grbit1	4	See grbit1 description below.
4	grbit2	2	See grbit2 description below.
P1	strCaption	STR	Specifies the user defined caption of the hierarchy. This string is written out only if fCap in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fOutlineMode	1	=1 if new levels are shown in Outline mode.
1	fEnableMultiplePageItems	1	=1 if the user can select multiple members when the hierarchy is in the page field area of the view.
2	fSubtotalAtTop	1	=1 if new levels added to the view show their subtotals at the top.
3	fDontShowFList	1	=1 if this hierarchy is shown in the field list or similar mechanism in the user interface. This attribute depends on how the application exposes a list of fields for PivotTables in the user interface.
4	fDragToRow	1	=1 if the user can put this hierarchy into the row area of the PivotTable.
5	fDragToColumn	1	=1 if the user can put this hierarchy into the column area of the PivotTable.
6	fDragToPage	1	=1 if the user can put this hierarchy into the page area of the PivotTable.
7	fDragToHide	1	=1 if the user can remove this hierarchy from the PivotTable.
8	fDragToDate	1	=1 if the user is allowed to put this hierarchy into the data area of the view.
9	fFilterInclusive	1	=1 if manual filter is in inclusive mode (new items will not be included automatically after refresh) =0 if manual filter is not inclusive mode (new items will be included automatically after refresh).
10	unused	22	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadCap	1	=1 if strCaption is saved after the fixed size portion of the record
1	unused	15	Reserved

BRTENDSXTH

Record 319, Size 0

Represents the end of a OLAP hierarchy associated with the PivotTable.

BRTBEGINSXTHRWS

Record 320, Variable Size

Represents the collection of references to OLAP hierarchies on the row axis of a PivotTable.

Record data

Offset	Field Name	Size	Contents
0	rgisxth	RG 4	Specifies an array of references to an OLAP hierarchy in a PivotTable.

BRTENDISXTHRWS

Record 321, Size 0

Represents the end of the collection of references to OLAP hierarchies on the row axis of a PivotTable.

BRTBEGINISXTHCOLS

Record 322, Variable Size

Represents the collection of references to OLAP hierarchies on the column axis of a PivotTable.

Record data**Offset Field Name Size Contents**

0	rgisxth	RG 4	Specifies an array of references to an OLAP hierarchy in a PivotTable.
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BRTENDISXTHCOLS

Record 323, Size 0

Represents the end of the collection of references to OLAP hierarchies on the column axis of a PivotTable.

BRTBEGINSXTDMPS

Record 324, Size 4

Represents the collection of OLAP member property. Member properties contain additional information that's available about the items in an OLAP dimension field. For example, if a Geography dimension has property fields Population and Average Income available, you could create a PivotTable report that displays the sales figures for cities where your products are selling well. By displaying and analyzing the population and income figures for these cities, you could target cities with similar demographics for your marketing campaign.

Record data**Offset Field Name Size Contents**

0	csxtdmp	4	Specifies the number of OLAP member properties in the collection.
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BRTENDSXTDMPS

Record 325, Size 0

Represents the end of the collection of OLAP member property.

BRTBEGINSXTDMP

Record 326, Variable Size

Represents an OLAP member property.

Record data			
Offset	Field Name	Size	Contents
0	cchLevelUnq	2	Specifies the length of the unique name portion of name. For example, if the value for name equals "[Store].[Store Name].[Store Manager]", cchLevelUnq will equal 20. This would refer to "[Store].[Store Name]".
2	ichPropName	2	Specifies the index of the character where the property name portion begins in name. For example, if the value for name equals "[Store].[Store Name].[Store Manager]", ichPropName will equal 22. This would refer to starting character of "Store Manager".
4	cchPropName	2	Specifies the length of the property name portion of name. For example, if the value for name equals "[Store].[Store Name].[Store Manager]", cchPropName will equal 13. This would be length of "Store Manager".
6	isxtl	4	Specifies the index of the level to which this member property applies.
10	isxvd	4	Specifies the index of the field with which this member property is associated.
14	grbit1	2	See grbit1 description below.
16	strProperty	STR	Specifies the unique name of the OLAP member property. The following attributes depend on the name attribute: cchLevelUnq ichPropName cchPropName These attributes consist of metadata about a member in an OLAP cube and are usually displayed in a tooltip or mechanism in the user interface.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fDisplayInReport	1	=1 if the member property value will be shown in a cell.
1	fDisplayInTip	1	=1 if the member property value will be shown in a tooltip. This attribute depends on whether the application employs tooltips or similar mechanism in the user interface.
2	fDisplayInCaption	1	=1 if the member property value will be shown as a caption.
3	unused	13	Reserved

BRTENDSXTDMP

Record 327, Size 0

Represents the end of an OLAP member property.

BRTBEGINSXTHITEMS

Record 328, Size 8

Represents the collection of items that may be included or excluded.

Record data			
Offset	Field Name	Size	Contents
0	csz	4	Specifies the number of items in the collection.
4	isxtl	4	Specifies the hierarchy level with which these items are associated.

BRTENDSXTHITEMS

Record 329, Size 0

Represents the end of the collection of items that may be included or excluded.

BRTBEGINSXTHITEM

Record 330, Variable Size

Represents an item that may be included or excluded for OLAP pivottable.

Record data			
Offset	Field Name	Size	Contents
0	strItem	STR	Specifies the name of a hidden item.

BRTENDSXTHITEM

Record 331, Size 0

Represents the end of an item that may be included or excluded.

BRTBEGINISXVIS

Record 388, Variable Size

Collection of indices into the shared items table in the PivotCache

Record data			
Offset	Field Name	Size	Contents
0	rgisxvi	RG 4	Specifies an array of indices into the shared items table in the PivotCache.

BRTENDISXVIS

Record 389, Size 0

The end of the collection of indices into the shared items table in the PivotCache

BRTBEGINAUTOSORTSCOPE

Record 459, Size 0

Represents the beginning of the sorting scope for the PivotTable.

BRTENDAUTOSORTSCOPE

Record 460, Size 0

Represents the end of the sorting scope for the PivotTable.

BRTBEGINSXCRTFORMAT

Record 481, Size 12

Represents the format defined in the PivotChart that is associated with this PivotTable.

Record data**Offset Field Name Size Contents**

0	dwChart	4	Specifies the index of the chart part to which the formatting applies.
4	dwFmt	4	Specifies the index of the pivot format that is currently in use. This index corresponds to a dxf element in the <u>STYLES</u> part.
8	fSeries Formatting	4	=1 if this format applies to a series. =0 if this format applies to a data point.

BRTENDSXCRFORMAT

Record 482, Size 0

Represents the end of the format defined in the PivotChart that is associated with this PivotTable.

BRTBEGINSXCRTFORMATS

Record 483, Size 4

Represents the collection of formats applied to PivotChart.

Record data**Offset Field Name Size Contents**

0	csxcrtformats	4	Specifies the number of formats in the collection.
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BRTENDSXCRFORMATS

Record 484, Size 0

Represents the end of the collection of formats applied to PivotChart.

BRTTABLESTYLECLIENT

Record 513, Variable Size

Represent information on style applied to the PivotTable.

Record data**Offset Field Name Size Contents**

0	grbit1	2	See grbit1 description below.
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4 strName STR Specifies the name of the table style to use with this table.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fFirstColumn	1	=1 if the first column will be displayed.
1	fLastColumn	1	=1 if the last column will be displayed.
2	fRowStripes	1	=1 if row stripe formatting will be displayed.
3	fColumnStripes	1	=1 if column stripe formatting will be displayed.
4	fRowHeaders	1	=1 if row headers will be displayed for the table.
5	fColumnHeaders	1	=1 if column headers will be shown for the table.
6	unused	10	Reserved

BRTBEGINSXCONDfmt

Record 558, Size 12

Represents the conditional formatting defined in the PivotTable.

Record data

Offset	Field Name	Size	Contents
0	sxcondfmt Scope	4	Specifies the scope of PivotTable conditional formatting rule. 0= Selection scope 1= Data field scope 2= Field intersection scope.
4	sxcondfmt Type	4	Specifies the type of PivotTable conditional formatting rule. See associated simple type definition for details. This is for top/bottom N and above/below average rules only. 1= All values 2= Each column group 3= Each row group
8	ipriority	4	Specifies the priority of PivotTable conditional formatting rule.

BRTEENDSXCONDfmt

Record 559, Size 0

Represents the end of the conditional formatting defined in the PivotTable.

BRTBEGINSXCONDfMTS

Record 560, Size 4

Represents the collection of conditional formats applied to a PivotTable.

Record data			
Offset	Field Name	Size	Contents
0	csxcondfmts	4	Specifies the number of conditional formats defined for the PivotTable.

BRTENDSXCONDFTS

Record 561, Size 0

Represents the end of the collection of conditional formats applied to a PivotTable.

BRTBEGINSXFILTERS

Record 599, Size 4

Represents the collection of filters that apply to this PivotTable.

Record data			
Offset	Field Name	Size	Contents
0	csxfilter	4	Specifies the number of pivot filters in the collection.

BRTENDSXFILTERS

Record 600, Size 0

Represents the end of the collection of filters that apply to this PivotTable.

BRTBEGINSXFILTER

Record 601, Variable Size

Represents a PivotTable advanced filter.

Record data			
Offset	Field Name	Size	Contents
0	isxvd	4	Specifies the index of the field to which this pivot filter belongs.
4	isxvdMProp	4	Specifies the index of the field representing the member property field on which this pivot filter is defined. This attribute is used only by label pivot filters.
8	sxft	4	Specifies the type of the pivot filter. The type can be various declinations of 4 main categories: 1= Top/Bottom (Count, Percent, Sum) 2= Label 4= Value 16= Date
12	iEvalOrder	4	Specifies the evaluation order of the pivot filter for measure-based filters (top/bottom, value). This attribute is zero-based and it is used to create the name for the filter set in the MDX.
16	dwId	4	Specifies the unique identifier of the pivot filter as assigned by the PivotTable.

20	isxdimMeasure	4	Specifies the index of the measure field. This attribute is used only by filters in Relational pivots and specifies on which measure a value filter should apply.
24	isxthMeasure	4	Specifies the index of the measure cube field. This attribute is used only by filters in OLAP pivots and specifies on which measure a value filter should apply.
28	grbit1	2	See grbit1 description below.
P1	strName	STR	Specifies the name of the pivot filter. This string is written out only if fLoadName in grbit1 is true.
P2	strDescription	STR	Specifies the description of the pivot filter. This string is written out only if fLoadDescription in grbit1 is true.
P3	strVal1	STR	Specifies the string value "1" used by label pivot filters. This string is written out only if fLoadVal1 in grbit1 is true.
P4	strVal2	STR	Specifies the string value "2" used by label pivot filters. This string is written out only if fLoadVal2 in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadName	1	=1 if strName is saved after the fixed size portion of the record
1	fLoad Description	1	=1 if strDescription is saved after the fixed size portion of the record
2	fLoadVal1	1	=1 if strVal1 is saved after the fixed size portion of the record
3	fLoadVal2	1	=1 if strVal2 is saved after the fixed size portion of the record
4	unused	12	Reserved

BRTENDSXFILTER

Record 602, Size 0

Represents the end of a PivotTable advanced filter.

BRTBEGINSXRULES

Record 641, Size 4

Represents the collection of pivot areas that comprise the PivotTable location.

Record data

Offset	Field Name	Size	Contents
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0	csxrules	4	Specifies the number of PivotAreas for the PivotTable location.
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BRTENDSXRULES

Record 642, Size 0

Represents the end of the collection of pivot areas that comprise the PivotTable location.

BRTSXTDMPORDER

Record 668, Size 4

Represents an OLAP member property.

Record data

Offset Field Name Size Contents

0	isxvd	4	Specifies the index of the field with which this member property is associated.
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PivotCache Definitions Part

Represents the metadata of the record cache that supports PivotTable views and sheet data formulas. For a more detailed description of the PivotTable itself, please go to the [PivotTable part](#) documentation.

RECORD ORDER

brtBeginPivotDef [[Record 179](#)]

 brtBeginPCDSsource [[Record 185](#)]

 brtBeginPCDSRange [[Record 187](#)]

 (only used when brtBeginPCDSsource.isrctype = 0)

 brtEndPCDSRange [[Record 188](#)]

 brtBeginPCDSConsol [[Record 207](#)]

 (only used when brtBeginPCDSsource.isrctype = 2)

 brtBeginPCDSCPages [[Record 209](#)]

 brtBeginPCDSCPPage [[Record 211](#)] (Occurs 0 to 4 times)

 brtBeginPCDSCPItem [[Record 213](#)] (Occurs 0 or more times)

 brtEndPCDSCPItem [[Record 214](#)]

 brtEndPCDSCPPage [[Record 212](#)]

 brtEndPCDSCPages [[Record 210](#)]

 brtBeginPCDSCSets [[Record 215](#)]

 brtBeginPCDSCSet [[Record 217](#)] (Occurs 1 or more times)

 brtEndPCDSCSet [[Record 218](#)]

 brtEndPCDSCSets [[Record 216](#)]

 brtEndPCDSConsol [[Record 208](#)]

 brtEndPCDSsource [[Record 186](#)]

 brtBeginPCDFields [[Record 181](#)]

 brtBeginPCDField [[Record 183](#)] (Occurs 1 or more times.)

 brtBeginPNames [[Record 253](#)] (Occurs 0 to 1 times)

 (only used when fLoadFmla in brtBeginPCDField equals one)

 brtBeginPName [[Record 255](#)] (Occurs 0 or more times)

 brtBeginPNPairs [[Record 257](#)] (Occurs 0 to 1 times)

 brtBeginPNPair [[Record 259](#)] (Occurs 0 or more times)

 brtEndPNPair [[Record 260](#)]

 brtEndPNPairs [[Record 258](#)]

brtEndPName [[Record 256](#)]
brtEndPNames [[Record 254](#)]
brtBeginPCDFAtbl [[Record 189](#)]
 brtPCRRecord [[Record 33](#)] (occurs 0 or more times)
 brtPCRRecordDt [[Record 34](#)] (occurs 0 or more times)
 brtPCDIMissing [[Record 20](#)] (occurs 0 or more times)
 brtPCDINumber [[Record 21](#)] (occurs 0 or more times)
 brtPCDIBoolean [[Record 22](#)] (occurs 0 or more times)
 brtPCDIError [[Record 23](#)] (occurs 0 or more times)
 brtPCDIString [[Record 24](#)] (occurs 0 or more times)
 brtPCDIDatetime [[Record 25](#)] (occurs 0 or more times)
 brtPCDIIndex [[Record 26](#)] (occurs 0 or more times)
 brtPCDIAMissing [[Record 27](#)] (occurs 0 or more times)
 brtPCDIANumber [[Record 28](#)] (occurs 0 or more times)
 (Only used for OLAP PivotCaches created in Excel 2007
 and later)
 brtPCDIABluean [[Record 29](#)] (occurs 0 or more times)
 (Only used for OLAP PivotCaches created in Excel 2007
 and later)
 brtPCDIALError [[Record 30](#)] (occurs 0 or more times)
 (Only used for OLAP PivotCaches created in Excel 2007
 and later)
 brtPCDIAString [[Record 31](#)] (occurs 0 or more times)
 (Only used for OLAP PivotCaches created in Excel 2007
 and later)
 brtPCDIDatetime [[Record 32](#)] (occurs 0 or more
 times)
 (Only used for OLAP PivotCaches created in Excel 2007
 and later)
 brtBeginPCDIRun [[Record 191](#)] (occurs 0 or more
 times)
 brtEndPCDIRun [[Record 192](#)]
brtEndPCDFAtbl [[Record 190](#)]
brtBeginPCDFGroup [[Record 219](#)] (Occurs 0 to 1 times)
 brtBeginPCDFGRange [[Record 223](#)] (Occurs 0 or 1 times)
 (Can't be used with brtEndPCDFGDiscrete.)
 brtEndPCDFGRange [[Record 224](#)]
 brtBeginPCDFGDiscrete [[Record 225](#)] (Occurs 0 or 1 times)
 (Can't be used with brtBeginPCDFGRange.)
 brtPCDIIndex [[Record 26](#)]

brtEndPCDFGDiscrete [Record 226]
brtBeginPCDFGItems [Record 221] (Occurs 0 or 1 times)
 brtPCDIMissing [Record 20] (occurs 0 or more times)
 brtPCDINumber [Record 21] (occurs 0 or more times)
 brtPCDIBoolean [Record 22] (occurs 0 or more times)
 brtPCDIError [Record 23] (occurs 0 or more times)
 brtPCDIString [Record 24] (occurs 0 or more times)
 brtPCDIDatetime [Record 25] (occurs 0 or more times)
 brtBeginPCDIRun [Record 191] (occurs 0 or more times)
 brtEndPCDIRun [Record 192]
 brtEndPCDFGItems [Record 222]
brtEndPCDFGroup [Record 220]
brtEndPCDField [Record 184]
brtEndPCDFields [Record 182]
brtBeginPCDCalcItems [Record 243] (Occurs 0 to 1 times)
 brtBeginPCDCalcItem [Record 245] (Occurs 1 or more times)
 <PRule Records>
 brtBeginPNames [Record 253] (Occurs 0 to 1 times)
 (only used when fLoadFmla in brtBeginPCDField equals one)
 brtBeginPName [Record 255] (Occurs 0 or more times)
 brtBeginPNPairs [Record 257] (Occurs 0 to 1 times)
 brtBeginPNPair [Record 259] (Occurs 0 or more times)
 brtEndPNPair [Record 260]
 brtEndPNPairs [Record 258]
 brtEndPName [Record 256]
 brtEndPNames [Record 254]
brtEndPCDCalcItems [Record 244]
brtBeginPCDHierarchies [Record 195] (Occurs 0 to 1 times)
 (Only valid for OLAP PivotTables.)
 brtBeginPCDHierarchy [Record 197] (Occurs 1 or more times)
 brtBeginPCDHFieldsUsage [Record 199] (Occurs 0 to 1 times)
 brtEndPCDHFieldsUsage [Record 200]
 brtBeginPCDHGLevels [Record 435] (Occurs 0 to 1 times)
 brtBeginPCDHGLevel [Record 437] (Occurs 1 or more times)

brtBeginPCDHGLGroups [Record 439] (Occurs 0 to 1 times)

brtBeginPCDHGLGroup [Record 441] (Occurs 1 or more times)

brtBeginPCDHGLGMembers [Record 443] (Occurs 0 or 1 times)

brtBeginPCDHGLGMember [Record 445] (Occurs 1 or more times)

brtEndPCDHGLGMember [Record 446]

brtEndPCDHGLGMembers [Record 444]

brtEndPCDHGLGroup [Record 442]

brtEndPCDHGLGroups [Record 440]

brtEndPCDHGLLevel [Record 438]

brtEndPCDHGLLevels [Record 436]

brtEndPCDHierarchy [Record 198]

brtEndPCDHierarchies [Record 196]

brtBeginPCDKPIs [Record 269] (Occurs 0 to 1 times)
(Only valid for OLAP PivotTables.)

brtBeginPCDKPI [Record 271] (Occurs 0 or more times)

brtEndPCDKPI [Record 272]

brtEndPCDKPIs [Record 270]

brtBeginPCDCalcMems [Record 431] (Occurs 0 to 1 times)
(Only valid for OLAP PivotTables.)

brtBeginPCDCalcMem [Record 433] (Occurs 1 or more times)

brtEndPCDCalcMem [Record 434]

brtEndPCDCalcMems [Record 432]

brtBeginPCDSDTupleCache [Record 227] (Occurs 0 to 1 times)
(Only valid for sheet data-based OLAP PivotTables.)

brtBeginPCDSDTCEEntries [Record 229] (Occurs 0 to 1 times)

brtPCDIMissing [Record 20] (occurs 0 or more times)

brtPCDINumber [Record 21] (occurs 0 or more times)

brtPCDIError [Record 23] (occurs 0 or more times)

brtPCDIString [Record 24] (occurs 0 or more times)

brtBeginPCDSDTCEMembers [Record 231] (Occurs 0 to 1 times)

brtBeginPCDSDTCEMember [Record 233] (Occurs 1 or more times)

brtendPCDSDTCEMember [Record 234]

brtEndPCDSDTCEMembers [Record 232]

brtEndPCDSDTCEEntries [Record 230]
brtBeginPCDSDTCSets [Record 239] (Occurs 0 to 1 times)
 brtBeginPCDSDTCSets [Record 241] (Occurs 1 or more times)
 brtBeginPCDSDTCEMembers [Record 231] (Occurs 0 to 1 times)
 brtBeginPCDSDTCEMember [Record 233] (Occurs 1 or
 more times)
 brtEndPCDSDTCEMember [Record 234]
 brtEndPCDSDTCEMembers [Record 232]
 brtBeginPCDSDTCEMembersSortBy [Record 646] (Occurs 0 to 1
 times)
 brtBeginPCDSDTCEMember [Record 233] (Occurs 1 or
 more times)
 brtEndPCDSDTCEMember [Record 234]
 brtEndPCDSDTCEMembersSortBy [Record 647]
brtEndPCDSDTCSets [Record 240]
brtEndPCDSDTCSets [Record 242]
brtBeginPCDSDTCQueries [Record 235] (Occurs 0 to 1 times)
 brtBeginPCDSDTCQuery [Record 237] (Occurs 1 or more times)
 brtBeginPCDSDTCEMembers [Record 231] (Occurs 0 to 1 times)
 brtBeginPCDSDTCEMember [Record 233] (Occurs 1 or
 more times)
 brtEndPCDSDTCEMember [Record 234]
 brtEndPCDSDTCEMembers [Record 232]
 brtEndPCDSDTCQuery [Record 238]
brtEndPCDSDTCQueries [Record 236]
brtBeginPCDSFCIEntries [Record 657] (Occurs 0 to 1 times)
 brtBeginPCDSFCIEntry [Record 659]
brtEndPCDSFCIEntries [Record 658]
brtEndPCDSDTupleCache [Record 228]
brtBeginDims [Record 273] (Occurs 0 to 1 times)
 (Only valid for OLAP PivotTables.)
 brtBeginDim [Record 275] (Occurs 1 or more times)
 brtEndDim [Record 276]
 brtEndDims [Record 274]
brtBeginMGs [Record 486] (Occurs 0 to 1 times)
 (Only valid for OLAP PivotTables.)
 brtBeginMG [Record 490] (Occurs 1 or more times)
 brtEndMG [Record 491]

brtEndMGs [Record 487]

brtBeginMGMMaps [Record 488] (Occurs 0 to 1 times)
 (Only valid if brtBeginMGs exists.)

brtBeginMGMap [Record 492] (Occurs 1 or more times)

brtEndMGMap [Record 493]

brtEndMGMMaps [Record 489]

brtEndPivotDef [Record 180]

BRTBEGINPIVOTCACHEDEF

Record 179, Variable Size

Represents the pivotCacheDefinition part. This part defines each field in the source data, including the name, the string resources of the instance data (for shared items), and information about the type of data that appears in the field.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	citmGhostMax	4	Specifies the number of unused items to allow before discarding unused items. This member is application-dependent. The application must specify a threshold for unused items.
8	numRefreshed Date	8	Specifies the date when the cache was last refreshed. This member depends on whether the application exposes mechanisms via the user interface whereby the end-user can refresh the cache. This value is of type NUM.
16	grbit2	1	See grbit2 description below.
17	crecords	4	Specifies the number of records in the pivotCacheRecords part.
P1	strRefreshedWho	STR	Specifies the name of the end-user who last refreshed the cache. This member is application-dependent and is specified by applications that track and store the identity of the current user. This member also depends on whether the application exposes mechanisms via the user interface whereby the end-user can refresh the cache. This string is written out only if fLoadRefreshedWho in grbit2 is true.
P2	strRelIDRecords	STR	Specifies the unique identifier that corresponds to the related <u>PivotCache Records Part</u> . This string is written out only if fLoadRelIDRecords in grbit2 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	bVerCacheLastRefresh	8	<p>Specifies the version of the application that last refreshed the cache. This member depends on whether the application exposes mechanisms via the user interface whereby the end-user can refresh the cache.</p> <p>For Excel one of the following:</p> <ul style="list-style-type: none"> 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
8	bVerCacheRefreshableMin	8	<p>Specifies the earliest version of the application that is required to refresh the cache. This member is application-dependent.</p> <p>For Excel one of the following:</p> <ul style="list-style-type: none"> 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
16	bVerCacheCreated	8	<p>Specifies the version of the application that created the cache. This member is application-dependent.</p> <p>For Excel one of the following:</p> <ul style="list-style-type: none"> 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
24	fSaveData	1	=1 if pivot records are saved in the cache.
25	fInvalid	1	=1 if the cache is invalid and needs to be refreshed.
26	fRefreshOnLoad	1	<ul style="list-style-type: none"> =1 if the application will refresh the cache when the workbook is loaded. =0 if the application will not automatically refresh cached data. The end user must trigger refresh of the cache manually via the application user interface.
27	fOptimizeCache	1	<p>This member is application-dependent. This application must define its own cache optimization methods. The application must also decide whether to expose cache optimization status via the user interface or an object model.</p> <ul style="list-style-type: none"> =1 if the application will apply optimizations to the cache. =0 if the application will not apply optimizations to the cache.
28	fEnableRefresh	1	<p>This member depends on whether the application exposes a method for allowing end-users control over refreshing the cache via the user interface.</p> <ul style="list-style-type: none"> =1 if the end-user can refresh the cache.
29	fBackgroundQuery	1	=1 if the application will retrieve records asynchronously from the cache.
30	fUpgradeOnRefresh	1	<p>This member depends on whether the application exposes mechanisms via the user interface whereby the cache may be upgraded.</p> <ul style="list-style-type: none"> =1 if the cache is scheduled for upgrade.

31	fSheetData	1	=1 if information about OLAP sheet data functions are stored in the PivotCache.
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The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadRefreshedWho	1	=1 if a user (who refreshed the PivotCache) name string is saved after the fixed size portion of the record.
1	fLoadRelIDRecords	1	=1 if a relationship ID string is saved after the fixed size portion of the record.
2	fSupportSubquery	1	=1 if the cache's data source supports subqueries. Only valid for OLAP data sources.
3	fSupportAttribDrill	1	=1 if the cache's data source supports attribute drilldown. Only valid for OLAP data sources.
4	unused	4	Reserved

BRTENDPIVOTCACHEDEF

Record 180, Size 0

Represents the end of the pivotCacheDefinition part.

BRTBEGINPCDFIELDS

Record 181, Size 4

Represents the collection of field definitions in the source data.

Record data			
Offset	Field Name	Size	Contents
0	cfields	4	Specifies the number of fields in the cache.

BRTENDPCDFIELDS

Record 182, Size 0

Represents the end of the collection of field definitions in the source data.

BRTBEGINPCDFIELD

Record 183, Variable Size

Represent a single field in the PivotCache. This definition contains information about the field, such as its source, data type, and location within a level or hierarchy. The sharedItems complex type stores additional information about the data in this field. If there are no shared items, then values are stored directly in the pivotCacheRecords part.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	grbit2	1	See grbit2 description below.

2	ifmt	4	Specifies the number format that is applied to all items in the field. Number formats are written to the Styles Part .
			Note: Formatting information provided by the cell table and by the PivotTable need not agree. If the two formats differ, the cell-level formatting takes precedence. If you change the layout of the PivotTable, the PivotTable formatting will then take precedence.
6	wTypeSql	2	Specifies the SQL data type of the field. This member stores an ODBC data type and only applies to ODBC data sources. A value is supplied for this member only if it is provided to the application. See endnote for the data types supported by ODBC. ^{xi}
8	ihdb	4	Specifies the index of the hierarchy that this field is part of. Only valid for OLAP data sources.
12	isxtl	4	Specifies the index of the hierarchy level that this field is part of. Only valid for OLAP data sources.
16	cIsxtmps	4	Specifies the number of member property mappings for this field. Only valid for OLAP data sources.
P1	strName	STR	Specifies the name of the cache field.
P2	strCaption	STR	Specifies the caption of the cache field. This string is written out only if <code>fCaption</code> in <code>grbit1</code> is true.
P3	FMLA	FMLA	<p>Specifies the formula for the calculated field. This formula is specified by the end-user. Calculated fields can perform calculations by using the contents of other fields in the PivotTable. In formulas you create for calculated fields, you can use operators and expressions as you do in other worksheet formulas. You can use constants and refer to data from the PivotTable, but you cannot use cell references or defined names. You cannot use worksheet functions that require cell references or defined names as arguments, and you cannot use array functions. This formula is written out only if <code>fLoadFmla</code> in <code>grbit2</code> is true. Further behaviors and restrictions apply to formulas for calculated fields:</p> <p>Formulas for calculated fields operate on the sum of the underlying data for any fields in the formula. For example, the formula <code>=Sales * 1.2</code> multiplies the sum of the sales for each type and region by 1.2; it does not multiply each individual sale by 1.2 and then sum the multiplied amounts.</p> <p>Formulas cannot refer to totals.</p> <p>For more information about formulas see Formula Part. For more information about defined names see the Workbook Part.</p>
P4	rgisxtmp	RG 4	A sequence of ints representing member property indexes. Written out only when <code>cIsxtmps > 0</code> . Note that this array is not written out with its size immediately preceding it.
P5	strPropName	STR	Specifies the name of the property if this field is an OLAP property field. This string is written out only if <code>fLoadPropName</code> in <code>grbit2</code> is true.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fServerBased</code>	1	=1 if this field is a server-based page/report field. Note: this member applies to ODBC sources only.
1	<code>fCantGetUniqueItems</code>	1	The member only applies to PivotTables that use ODBC and is intended to be used in conjunction with optimization features in the application. For example, the application can optimize memory usage when populating PivotCache records if it has a list of unique items for a field before all the records are retrieved from ODBC. =1 if the application was unable to get a list of unique values for the field.
2	<code>fSrcField</code>	1	=1 if the field is from the source database. =0 if the field was created by the application. Note: This member could be used for a defined grouped or calculated field. In this case, source database fields should precede defined grouped or calculated fields.
3	<code>fCaption</code>	1	=1 if <code>strCaption</code> is saved after the fixed size portion of the record.
4	<code>fOlapMemPropField</code>	1	=1 if this field contains OLAP member property information.
5	<code>unused</code>	3	Reserved

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fLoadFmla</code>	1	=1 if a formula is saved after the fixed size portion of the record.
1	<code>fLoadPropName</code>	1	=1 if <code>strPropName</code> is saved after the fixed size portion of the record.
2	<code>unused</code>	6	Reserved

BRTENDPCDFIELD

Record 184, Size 0

Represent the end of a single field in the PivotCache.

BRTBEGINPCDSOURCE

Record 185, Size 8

Represents the description of the data source whose data is stored in the pivot cache. The data source refers to the underlying rows or database records that provide the data for a PivotTable. You can create a PivotTable report from a spreadsheet table/range, an external database (including OLAP cubes), multiple spreadsheet tables/ranges, or another PivotTable.

Information about the data source is stored in the connection record and is retrieved using the `dwConnID` member.

OLAP data sources are distinguished from other data sources. OLAP records are not stored in the pivotCacheRecords part, whereas all records for non-OLAP data sources are stored in the cache.

Record data

Offset	Field Name	Size	Contents
0	isrctype	4	Specifies the cache type. One of the following: 0= Single spreadsheet range 1= External database 2= Multiple spreadsheet ranges 3= Scenario summary report
4	dwConnID	4	Specifies the index to the workbook connection. This field is used when <code>isrctype</code> equals one. See the External Connections part for more information.

BRTENDPCDSOURCE

Record 186, Size 0

Represents the end of the description of the data source whose data is stored in the pivot cache.

BRTBEGINPCDSRANGE

Record 187, Size 3

Represents the spreadsheet range of the source of the data that is stored in the cache.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See <code>grbit1</code> description below.
1	fBuiltin	1	=1 if the reference is to one of Excel's built-in labels (defined names).
2	grbit2	1	See <code>grbit2</code> description below.
P1	strSheet	STR	Specifies the name of the sheet that is the source for the cached data. This string is written out only if <code>fLoadSheet</code> in <code>grbit2</code> is true.
P2	strRelId	STR	Specifies the identifier to the Sheet part whose data is stored in the cache. See the Sheet Part for more information. This string is written out only if <code>fLoadRelId</code> in <code>grbit2</code> is true.
P3	ref	16	Specifies the reference that defines a cell range that is the source of the data. This member depends on how the application implements cell references. This reference is written out only if <code>fName</code> in <code>grbit1</code> is false.
P3	strName	STR	Specifies the label (named range) that is the source of the data. This string is written out only if <code>fName</code> in <code>grbit1</code> is true.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fName	1	=1 if the reference is a label (defined name) string. =0 if the reference is a cell range.
1	unused	7	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadRelId	1	=1 if strRelId is saved after the fixed size portion of the record.
1	fLoadSheet	1	=1 if a strSheet is saved after the fixed size portion of the record
2	unused	6	Reserved

BRTENDPCDSRANGE

Record 188, Size 0

Represents the end of the worksheet range of the source of the data that is stored in the cache.

BRTBEGINPCDFATBL

Record 189, Variable Size

Represents the collection of unique/shared items for a field in the cache ([BRTBEGINPIVOTCACHEDEF](#)). This record stores data type and formatting information about the data in a field.

Items in the cache field can be shared in order to reduce the redundancy of those values that are referenced in multiple places across all the PivotTable parts. For example, a value might be part of a filter, it might appear on a row or column axis, and will appear in the pivotCacheRecords part as well. However, because of the performance cost of creating the optimized shared items, items are only shared if they are actually in use in the PivotTable. Therefore, depending on user actions on the PivotTable layout, the pivotCacheDefinition and underlying pivotCacheRecords part may be updated.

If there are no shared items, then field values are stored directly in the pivotCacheRecords part.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	citems	4	Specifies the number of shared items to load for this field.
P1	numMin	8	Specifies the minimum value found in this field. This data is saved only if fNumMinMaxValid in grbit1 is true.
P2	numMax	8	Specifies the maximum value found in this field. This data is saved only if fNumMinMaxValid in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fTextEtcField	1	=1 if the field contains at least one text value, and may also contain a mix of other data types and blank values.
1	fNonDates	1	=1 if the field contains at least one non-date value.
2	fDateInField	1	=1 if the field contains at least one date value.
3	fHasTextItem	1	=1 if this field contains at least one text value.
4	fHasBlankItem	1	=1 if this field contains one or more blank values.
5	fMixedTypes IgnoringBlanks	1	=1 if this field contains more than one data type ignoring any blank values.
6	fNumField	1	=1 if this field contains at least one numeric value.
7	fIntField	1	=1 if this field contains integer values. =0 if this field contains non-integer or mixed values.
8	fnumMinMax Valid	1	=1 if the minimum and maximum numbers for the field are valid-initialized.
9	fHasLongText Item	1	=1 if this field contains one or more text values that are more than 255 characters in length. Note: This is used because many legacy spreadsheet applications support a limit of 255 characters for text values.
10	unused	6	Reserved

BRTEENDPCDFATBL

Record 190, Size 0

Represents the end of the collection of unique/shared items for a field in the PivotCache.

BRTBEGINPCDHIERARCHIES

Record 195, Size 4

Represents the collection of OLAP hierarchies in the PivotCache.

Record data

Offset	Field Name	Size	Contents
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0	chier	4	Specifies the number of OLAP hierarchies in the cache.
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BRTEENDPCDHIERARCHIES

Record 196, Size 0

Represents the end of the collection of OLAP hierarchies in the PivotCache.

BRTBEGINPCDHIERARCHY

Record 197, Size 17

Represents an OLAP hierarchy in the PivotCache.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	clevels	4	Specifies the number of levels in this hierarchy.
6	isetParent	4	Specifies the parent hierarchy, by index, of the set.
10	iconset	4	Specifies the icon set to use to visualize a KPI trend or status expression. PivotTables use the icon sets available for conditional formatting. One of the following: 0= Default iconset. For status KPI this corresponds to 3 traffic lights. For trend KPI this corresponds to 3-arrows. 1= Variance Arrow - 3 arrow. 2= 3 arrows 3= Status Arrow Ascending - 5 arrows. 4= Status Arrow Descending - 5 arrows 5= Standard Arrow - 5 arrows gray. 6= Traffic Light Single - 3 traffic lights 1. 7= Traffic Light, Traffic Light Multiple - 3 traffic lights 2. 8= Gauge Ascending - 5 quarters. 9= Gauge Descending - 5 quarters. 10= Thermometer, Cylinder, Smiley Face - 3 signs. 11= Road Signs - 3 symbols.
14	grbit2	1	See grbit2 description below.
15	wAttribute MemberValueType	2	Specifies the data type of the member value. This member stores an OLEDB data type. Note: Data connectivity can use a number of different technologies. One example of potential values stored in this member can be found at: http://msdn2.microsoft.com/en-us/library/system.data.oledb.oledbtype(vs.71).aspx . wAttributeMemberValueType is stored for key attribute hierarchies in order to determine when the application will offer date filtering instead of label filtering in OLAP PivotTables. Date filtering is only offered when the data type is Date/Time. wAttributeMemberValueType="7" indicates a date/time data type.
P1	strUnique	STR	Specifies the unique name of the hierarchy.
P2	strDisplay	STR	Specifies the display name of the hierarchy.
P3	strDimUnq	STR	Specifies the unique name of the dimension to which this hierarchy belongs. This string is written out only if fLoadDimUnq in grbit2 is true.
P4	strDefaultUnq	STR	Specifies the unique name of the default member of this hierarchy. This string is written out only if fLoadDefaultUnq in grbit2 is true.

P5	strAllUnq	STR	Specifies the unique name of the "all" member of this hierarchy. This string is written out only if <code>fLoadAllUnq</code> in <code>grbit2</code> is true.
P6	strAllDisp	STR	Specifies the display name of the "all" member of this hierarchy. This string is written out only if <code>fLoadAllDisp</code> in <code>grbit2</code> is true.
P7	strDispFld	STR	Specifies the display folder in which this hierarchy should be displayed. This string is written out only if <code>fLoadDispFld</code> in <code>grbit2</code> is true.
P8	strMeasGrp	STR	Specifies the name of the measure group to which this hierarchy belongs. This string is written out only if <code>fLoadMeasGrp</code> in <code>grbit2</code> is true.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fMeasure	1	=1 if this hierarchy is a measure.
1	fSet	1	=1 if this hierarchy is a set.
2	fAttributeHierarchy	1	An attribute hierarchy is an OLAP member that is exposed as a flat, single-level hierarchy on the OLAP server. =1 if this hierarchy is an attribute hierarchy.
3	fMeasureHierarchy	1	=1 if this hierarchy contains all the measures.
4	fOnlyOneField	1	=1 if this hierarchy is associated with only one field. =0 if this field is not restricted to only one association due to its position in the user interface.
5	fTimeHierarchy	1	=1 if this hierarchy is of type time.
6	fKeyAttributeHierarchy	1	=1 if this hierarchy is the key attribute hierarchy in an OLAP dimension.
7	fAttributeMemberValue TypeKnown	1	=1 if the type of the special member property called "membervalue" is known.
8	fUnbalancedRealKnown	1	=1 if the value of <code>fUnbalancedReal</code> represents the correct unbalanced state of the field. =0 if the value of <code>fUnbalancedReal</code> has not yet been queried of the OLAP cube.
9	fUnbalancedReal	1	=1 if this hierarchy is unbalanced. For more information on balanced hierarchies, see the documentation provided for your OLAP server.
10	fUnbalancedGroupKnown	1	=1 if the value of <code>fUnbalancedGroupReal</code> represents the correct unbalanced state of the group field. =0 if the value of <code>fUnbalancedGroupReal</code> has not yet been queried of the OLAP cube.
11	fUnbalancedGroup	1	=1 if this hierarchy is unbalanced when grouped. For more information on balanced hierarchies, see the documentation provided for your OLAP server.

12	fHidden	1	=1 if this hierarchy is hidden.
13	unused	3	Reserved

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadDimUnq	1	=1 if <code>strDimUnq</code> is saved after the fixed size portion of the record.
1	fLoadDefaultUnq	1	=1 if <code>strDefaultUnq</code> is saved after the fixed size portion of the record.
2	fLoadAllUnq	1	=1 if <code>strAllUnq</code> is saved after the fixed size portion of the record.
3	fLoadAllDisp	1	=1 if <code>strAllDisp</code> is saved after the fixed size portion of the record.
4	fLoadDispFld	1	=1 if <code>strDispFld</code> is saved after the fixed size portion of the record.
5	fLoadMeasGrp	1	=1 if <code>strMeasGrp</code> is saved after the fixed size portion of the record.
6	unused	2	Reserved

BRTENDPCDHIERARCHY

Record 198, Size 0

Represents the end of an OLAP hierarchy in the PivotCache.

BRTBEGINPCDHFIELDSUSAGE

Record 199, Variable Size

Represents the fields (by index) in the cache that are being used by this hierarchy.

Record data			
Offset	Field Name	Size	Contents
0	rgifdb	RG 4	Represents an array of PivotCache field indices used by this hierarchy.

BRTENDPCDHFIELDSUSAGE

Record 200, Size 0

Represents the end of the fields in the cache that are being used by this hierarchy.

BRTBEGINPCDSCONSOL

Record 207, Size 2

Represents the description of the PivotCache source using multiple consolidation ranges. This record is used when the source of the PivotTable is a collection of ranges in the workbook. The ranges are specified in the `BRTBEGINPCDSCSET` records. The logic for how the application consolidates the data in the ranges is application-specific. For example, the application may consolidate data based on its position in the worksheet that the end-user specifies.

Record data**Offset Field Name Size Contents**

0	grbit1	2	See grbit1 description below.
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The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fAutoPage	1	=1 if the application will automatically create one page/report field to describe/qualify the source ranges.
1	unused	15	Reserved

BRTENDPCDSCONSOL

Record 208, Size 0

Represents the end of the description of the PivotCache source using multiple consolidation ranges.

BRTBEGINPCDSCPAGES

Record 209, Size 4

Represents the collection of consolidation source page/report field properties.

Record data**Offset Field Name Size Contents**

0	cpages	4	Specifies the number of page/report field properties in the collection.
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BRTENDPCDSCPAGES

Record 210, Size 0

Represents the end of the collection of consolidation source page/report fields.

BRTBEGINPCDSCPAGE

Record 211, Size 4

Represents the properties for a consolidation source page/report field.

Record data**Offset Field Name Size Contents**

0	citems	4	Specifies the number of page/report field item strings/values in the collection.
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BRTENDPCDSCPAGE

Record 212, Size 0

Represents the end of the properties of a consolidation source page/report field.

BRTBEGINPCDSCPITEM

Record 213, Variable Size

Represents an item value for a consolidation source page/report field.

Record data**Offset Field Name Size Contents**

0	strItem	STR	Specifies the name of a page/report field item string/value.
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BRTENDPCDSCPITEM

Record 214, Size 0

Represents the end of an item value for a consolidation source page/report field.

BRTBEGINPCDSCSETS

Record 215, Size 4

Represents the collection of reference-page/report items pairs.

Record data**Offset Field Name Size Contents**

0	csets	4	Specifies the number of reference-page/report items pairs.
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BRTENDPCDSCSETS

Record 216, Size 0

Represents the end of the collection of reference-page/report field items pairs.

BRTBEGINPCDSCSET

Record 217, Variable Size

Represents a single range in the [BRTBEGINPCDSCSETS](#) collection. This record is intended to facilitate creating a PivotTable report by consolidating spreadsheet ranges that have similar categories of data to be summarized. The simplest layout for the data source is for each range of data to be in table-like format, with column labels in the first row, row labels in the first column, the rest of the rows having similar items in the same row and column, and no blank rows or columns within the range. A particular range can consist of a built-in named range that is provided by the application, a user defined named range, a range reference, or a reference to an external workbook.

When multiple ranges are consolidated using this functionality, up to 4 custom report filters (also known as page fields) can be created to help filter the PivotTable report, by specifically enabling one or more of the individual ranges to be selected in the report filter. For each custom page/report field created, a custom label can be specified and assigned to each range participating in the consolidation range, so that the PivotTable can be filtered by one or more of the ranges being summarized.

Record data			
Offset	Field Name	Size	Contents
0	iitem0	4	Specifies the index of a page/report field item in page filter one.
4	iitem1	4	Specifies the index of a page/report field item in page filter two.
8	iitem2	4	Specifies the index of a page/report field item in page filter three.
12	iitem3	4	Specifies the index of a page/report field item in page filter four.
16	grbit1	1	See grbit1 description below.
17	fBuiltIn	1	=1 if the reference is to one of Excel's built-in labels (defined names).
18	grbit2	1	See grbit2 description below.
P1	strSheet	STR	Specifies the sheet name. This string is written out only if fLoadSheet in grbit2 is true.
P2	strRelId	STR	Specifies the unique identifier of the Workbook part where the range is stored. See Workbook for more information. This string is written out only if fLoadRelId in grbit2 is true.
P3	ref	16	Specifies the REF cell range. This cell range is written out only if fName in grbit1 is false.
P3	strName	STR	Specifies the named range. This string is written out only if fName in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fName	1	=1 if the reference is a label (defined name) string. =0 if the reference is a cell range.
1	unused	7	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadRelId	1	=1 if strRelId is saved after the fixed size portion of the record.
1	fLoadSheet	1	=1 if strSheet is saved after the fixed size portion of the record.
2	unused	6	Reserved

BRTENDPCDSCSET

Record 218, Size 0

Represents the end of the properties for a reference-page/report field items pair.

BRTBEGINPCDFGROUP

Record 219, Size 8

Represents the properties for a field group.

Record data**Offset Field Name Size Contents**

0	ifdbParent	4	Specifies the parent field of this field, if any, by field index.
4	ifdbBase	4	Specifies the base field of this field, if any, by field index.

BRTENDPCDFGROUP

Record 220, Size 0

Represents the end of the collection of properties for a field group.

BRTBEGINPCDFITEMS

Record 221, Size 4

Represents the collection of items in a field group.

Record data**Offset Field Name Size Contents**

0	citems	4	Specifies the number of items created for this grouped field.
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BRTENDPCDFITEMS

Record 222, Size 0

Represents the end of the collection of items in a field group.

BRTBEGINPCDFGRANGE

Record 223, Size 26

Represents the range grouping properties.

Record data**Offset Field Name Size Contents**

0	grbit1	2	See grbit1 description below.
2	numStart	8	Specifies the minimum value for numeric or date grouping intervals if fAutoStart in grbit1 is false.
10	numEnd	8	Specifies the maximum value for numeric or date grouping intervals if fAutoEnd in grbit1 is false.
18	numBy	8	Specifies the grouping interval (the size of each range/bucket) for numeric range grouping. Specifies the number of days to group by in date range grouping.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	iByType	8	Specifies how to group the values in the field. One of the following: 0= Group into ranges of values 1= Group into seconds 2= Group into minutes 3= Group into hours 4= Group into days 5= Group into months 6= Group into quarters 7= Group into years
8	fAutoStart	1	=1 if the beginning/minimum range value will be set from the source data. =0 if the beginning/minimum range value will be set from the value specified in numStart.
9	fAutoEnd	1	=1 if the ending/maximum range value will be set from the source data. =0 if the ending/maximum range value will be set by the value specified in numEnd.
10	fDates	1	=1 if the starting and ending values are dates. =0 if the starting and ending values are numbers.
11	Unused	5	Reserved

BRTENDPCDFGRANGE

Record 224, Size 0

Represents the end of the collection of range grouping properties.

BRTBEGINPCDFGDISCRETE

Record 225, Size 4

Represents the collection of discrete grouping properties for a field group.

Record data			
Offset	Field Name	Size	Contents
0	citems	4	Specifies the number of mapping indexes for this grouped field.

BRTENDPCDFGDISCRETE

Record 226, Size 0

Represents the end of the collection of discrete grouping properties for a field group.

BRTBEGINPCDSDTUPLECACHE

Record 227, Size 0

Represents the cache of OLAP sheet data members, or tuples.

BRTENDPCSDTUPLECACHE

Record 228, Size 0

Represents the end of the cache of OLAP sheet data members, or tuples.

BRTBEGINPCSDTCENTRIES

Record 229, Size 4

Represents the collection of OLAP sheet data entries.

Record data**Offset Field Name Size Contents**

0	centry	4	Specifies the number of entries in the collection.
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BRTENDPCSDTCENTRIES

Record 230, Size 0

Represents the end of the collection of OLAP sheet data entries.

BRTBEGINPCSDTCEMEMBERS

Record 231, Size 4

Represents members for the OLAP sheet data entry, also known as a tuple.

Record data**Offset Field Name Size Contents**

0	cmembers	4	Specifies the number of members in the collection.
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BRTENDPCSDTCEMEMBERS

Record 232, Size 0

Represents the end of members for the OLAP sheet data entry, also known as a tuple.

BRTBEGINPCSDTCEMEMBER

Record 233, Size 9

Represents an OLAP sheet data entry member.

Record data**Offset Field Name Size Contents**

0	bmrloc	1	=0 if iitem represents a hierarchy index. =1 if iitem represents a PivotCache field index.
1	idb	4	If bmrloc equals one, this specifies the index of the field to which the member belongs. If bmrloc equals zero, this specifies the index of the hierarchy to which the member belongs
5	iitem	4	Specifies the index of the item in the field that represents this item.

BRTENDPCSDTCMEMBER

Record 234, Size 0

Represents the end of an OLAP sheet data entry member.

BRTBEGINPCSDTCQUERIES

Record 235, Size 4

Represents the cache of OLAP sheet data queries.

Record data**Offset Field Name Size Contents**

0	cqueries	4	Specifies the number of cached queries in the collection.
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BRTENDPCSDTCQUERIES

Record 236, Size 0

Represents the end of the cache of OLAP sheet data queries.

BRTBEGINPCSDTCQUERY

Record 237, Variable Size

Represents an OLAP sheet data cached query.

Record data**Offset Field Name Size Contents**

0	strQuery	STR	Specifies the Multidimensional Expressions (MDX) query string. See the MDX Language Reference for more information. Note: Data connectivity can use a number of different technologies. One example of potential values stored in this member can be found at: http://msdn2.microsoft.com/en-us/library/ms145595.aspx .
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BRTENDPCSDTCQUERY

Record 238, Size 0

Represents the end of an OLAP sheet data cached query.

BRTBEGINPCSDTCSETS

Record 239, Size 4

Represents the collection of OLAP sheet data tuple sets.

Record data**Offset Field Name Size Contents**

0	csets	4	Specifies the number of tuple sets.
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BRTEENDPCDSDTCSSETS

Record 240, Size 0

Represents the end of the collection of OLAP sheet data sets.

BRTBEGINPCDSDTCSSET

Record 241, Variable Size

Represents an OLAP sheet data set or tuple set. The set is defined by a Multidimensional Expressions (MDX) query that specifies criteria for the dimension members that belong to the set.

For example, the following MDX expression defines the set for the 10 salespersons with the lowest sales:

```
BottomCount([Salesperson].[Salesperson Name].Members,10,[Measures].[Sales])
```

The MDX expression is specified in the setDefinition member.

Record data

Offset	Field Name	Size	Contents
0	ctuples	4	Specifies the number of tuples in the set.
4	iRankMax	4	Specifies the largest rank entry the user has requested.
8	ssoType	4	Specifies the sort order of the set. One of the following: 0= None 1= Ascending 2= Descending 3= Ascending – alphabetic order 4= Descending – alphabetic order 5= Ascending – natural order 6= Descending – natural order
12	grbit1	1	See grbit description below.
13	strDef	STR	Specifies the Multidimensional Expressions (MDX) set definition.

Note: Data connectivity can use a number of different technologies. One example of potential values stored in this member can be found at: <http://msdn2.microsoft.com/en-us/library/ms145595.aspx>.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fQueryFailed	1	=1 if a query against this set failed. =0 if the query against this set succeeded.
1	unused	7	Reserved

BRTENDPCDSDTCSET

Record 242, Size 0

Represents the end of an OLAP sheet data set.

BRTBEGINPCDCALCITEMS

Record 243, Size 4

Represents the collection of calculated items.

Record data**Offset Field Name Size Contents**

0	ccalcitems	4	Specifies the number of calculated item formulas in the cache.
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BRTENDPCDCALCITEMS

Record 244, Size 0

Represents the end of the collection of calculated items.

BRTBEGINPCDCALCITEM

Record 245, Variable Size

Represents an item within a PivotTable field that uses a formula.

Calculations and options available for a PivotTable depend on whether the source data came from an OLAP database or another type of database. This record applies to non-OLAP external data or on-worksheet data. See [BRTBEGINPCDCALCMEM](#) for information on calculations on OLAP data sources.

Record data**Offset Field Name Size Contents**

0	ifdb	4	Specifies the index of the pivot field (BRTPCDFIELD) with which this calculated item is associated.
---	------	---	---

4	FMLA	Specifies the formula of the calculated item. In formulas you create for calculated items, you can use operators and expressions as you do in other worksheet formulas. You can use constants and refer to data from the PivotTable, but you cannot use cell references or defined names. You cannot use worksheet functions that require cell references or defined names as arguments, and you cannot use array functions.
---	------	--

Further behaviors and restrictions apply to formulas for calculated items:

Formulas for calculated items operate on the individual records; the calculated item formula =Dairy *115% multiplies each individual sale of Dairy times 115%, after which the multiplied amounts are summarized together in the data area.

Formulas cannot refer to totals.

You can include the field name in a reference to an item. The item name must be in square brackets. Use this format to avoid #NAME? errors when two items in two different fields in a report have the same name.

You can refer to an item by its position in the PivotTable as currently sorted and displayed. The item referred to in this way can change whenever the positions of items change or different items are displayed or hidden. Hidden items are not counted in this index.

You can use relative positions to refer to items. The positions are determined relative to the calculated item that contains the formula. If the position you give is before the first item or after the last item in the field, the formula results in a #REF! error.

For more information about formulas see [Formulas Part](#). For more information about defined names see [brtName](#) in the [Workbook Part](#).

BRTEENDPCDCALCITEM

Record 246, Size 0

Represents the end of an item within a PivotTable field that uses a formula.

BRTBEGINP NAMES

Record 253, Size 4

Represents the collection of PivotCache field references.

Record data			
Offset	Field Name	Size	Contents
0	cnames	4	An unsigned int that contains the count of PivotCache field references in the collection.

BRTENDPNAME\$

Record 254, Size 0

Represents the end of the collection of PivotCache field references.

BRTBEGINPNAME

Record 255, Size 6

Holds information on a reference to a PivotTable field name.

Record data			
Offset	Field Name	Size	Contents
0	idfb	4	An unsigned int that represents an index to a PivotCache field.
4	grbit1	2	See <code>grbit1</code> description below.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	ifn	8	An unsigned byte that represents an aggregation function, which is one of the following: =0 SUM =1 COUNTA =2 AVG =3 MAX =4 MIN =5 PRODUCT =6 COUNT =7 STDEV =8 STDEVP =9 VAR =10 VARP =255 Aggregation function not specified
8	fErrName	1	=1 if the PivotTable field name reference is invalid.
9	unused	7	Reserved

BRTENDNAME

Record 256, Size 0

Represents the end of information on a reference to a PivotTable field.

BRTBEGINNPPAIRS

Record 257, Size 4

Represents the collection of Pivot field – Pivot item pairs.

Record data			
Offset	Field Name	Size	Contents
0	cpairs	4	An unsigned int that contains the count of Pivot field – Pivot item pairs in the collection.

BRTENDPNPAIRS

Record 258, Size 0

Represents the end of the collection of Pivot field – Pivot item pairs.

BRTBEGINPNPAIR

Record 259, Size 9

Holds information on a reference to a PivotTable field name.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	ifield	4	An unsigned int that represents an index to a Pivot field.
5	iitem	4	An unsigned int that represents a Pivot item index or a Pivot item position depending on the setting of fPhysical in grbit1.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fPhysical	1	=1 if the Pivot item is referenced by position. =0 if the Pivot item is referenced by index.
1	fRelative	1	Valid only when fPhysical is 1. =1 if the position is relative. =0 if the position is absolute.
2	unused	6	Reserved

BRTBEGINPNPAIR

Record 260, Size 0

The end of information about a reference to a PivotTable field name

BRTBEGINPCDKPIS

Record 269, Size 4

Represents the collection of Key Performance Indicators (KPIs) defined on the OLAP server and stored in the PivotCache.

Record data			
Offset	Field Name	Size	Contents
0	ckpis	4	Specifies the number of KPIs stored in the PivotCache.

BRTENDPCDKPIS

Record 270, Size 0

Represents the end of the collection of Key Performance Indicators (KPIs) defined on the OLAP server and stored in the PivotCache.

BRTBEGINPCDKPI

Record 271, Variable Size

Represents the KPI defined on the OLAP server and stored in the PivotCache.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
P1	strUnique	STR	Specifies the unique name of the KPI.
P2	strDisplay	STR	Specifies the display name of the KPI.
P3	strDispFld	STR	Specifies the folder where this KPI will be displayed in a list of fields for the PivotTable. This depends on how the application exposes a list of fields in the user interface. This string is written out only if fLoadDispFld in grbit1 is true.
P4	strMeasGrp	STR	Specifies the name of the measure group to which this KPI belongs. This string is written out only if fLoadMeasGrp in grbit1 is true.
P5	strParent	STR	Specifies the name of the parent KPI for this KPI. This string is written out only if fLoadParent in grbit1 is true.
P6	strValue	STR	Specifies the unique name of the KPI value measure.
P7	strGoal	STR	Specifies the unique name of the KPI goal measure. This string is written out only if fLoadGoal in grbit1 is true.
P8	strStatus	STR	Specifies the unique name of the KPI status measure. This string is written out only if fLoadStatus in grbit1 is true.
P9	strTrend	STR	Specifies the unique name of the KPI trend measure. This string is written out only if fLoadTrend in grbit1 is true.
P10	strWeight	STR	Specifies the unique name of the KPI weight measure. This string is written out only if fLoadWeight in grbit1 is true.
P11	strCurTimeMbr	STR	Specifies the unique name of the KPI current time member. This string is written out only if fLoadCurTimeMbr in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadDispFld	1	=1 if strDispFld is saved after the fixed size portion of the record.
1	fLoadMeasGrp	1	=1 if strMeasGrp is saved after the fixed size portion of the record.
2	fLoadParent	1	=1 if strParent is saved after the fixed size portion of the record.
3	fLoadGoal	1	=1 if strGoal is saved after the fixed size portion of the record.
4	fLoadStatus	1	=1 if strStatus is saved after the fixed size portion of the record.
5	fLoadTrend	1	=1 if strTrend is saved after the fixed size portion of the record.
6	fLoadWeight	1	=1 if strWeight is saved after the fixed size portion of the record.
7	fLoadCurTimeMbr	1	=1 if strCurTimeMbr is saved after the fixed size portion of the record.

BRTENDPCDKPI

Record 272, Size 0

Represents the end of a KPI defined on the OLAP server and stored in the PivotCache.

BRTBEGINDIMS

Record 273, Size 4

Represents the collection of PivotTable OLAP dimensions.

Record data

Offset	Field Name	Size	Contents
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0	cdims	4	Specifies the number of OLAP dimensions in the PivotTable.
---	-------	---	--

BRTENDDIMS

Record 274, Size 0

Represents the end of the collection of PivotTable OLAP dimensions.

BRTBEGINDIM

Record 275, Variable Size

Represents a PivotTable OLAP Dimension. A dimension is a field that organizes a single type of data into a hierarchy with levels of detail. For example, an OLAP database could contain a Time dimension providing data for levels Year, Month, Week, and Day, allowing you to create reports that let you compare day-to-day sales results or view a summary of your sales for an entire year.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	grbit1	1	See grbit1 description below.
---	--------	---	-------------------------------

P1	strName	STR	Specifies the name of the dimension.
P2	strUnique	STR	Specifies the unique name of the dimension.
P3	strDisplay	STR	Specifies the display name of the dimension.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fMeasure	1	=1 if this dimension is a measure dimension.
1	unused	7	Reserved

BRTENDDIM

Record 276, Size 0

Represents the end of a PivotTable OLAP Dimension.

BRTBEGINPCDCALCMEMS

Record 431, Size 4

Represents the collection of calculated members in an OLAP PivotTable.

Record data

Offset	Field Name	Size	Contents
0	ccalcmems	4	Specifies the number of calculated members.

BRTENDPCDCALCMEMS

Record 432, Size 0

Represents the end of the collection of calculated members in the OLAP PivotTable.

BRTBEGINPCDCALCMEM

Record 433, Size 12

Represents a calculated OLAP hierarchy. A calculated member is a member of an OLAP-based PivotTable whose value is calculated on the OLAP server. For PivotTables that are created from OLAP cubes the summarized values are pre-calculated on the OLAP server before the spreadsheet application displays the results. These fields appear in the PivotTable field list but cannot be changed from within the PivotTable. You cannot change the summary function used to calculate data fields or subtotals, or add calculated items.

Calculated members are defined by the Multidimensional Expressions (MDX) expression.

Record data

Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	wSolveOrder	4	Specifies the order in which this calculated member is calculated in relation to other calculated members.

8	fSet	4	=1 if this is a calculated set. =0 if this is a calculated member.
P1	strName	STR	Specifies the name of the calculated member.
P2	strMDXFormula	STR	Specifies the MDX formula for the calculated member.
Note: Data connectivity can use a number of different technologies. One example of potential values stored in this member can be found at: http://msdn2.microsoft.com/en-us/library/ms145595.aspx .			
P3	strMemberName	STR	Specifies the OLAP member name for the calculated member. This string is written out only if fLoadMemberName in grbit1 is true.
P4	strSourceHier	STR	Specifies the name of the hierarchy to which the calculated member belongs. This string is written out only if fLoadSourceHier in grbit1 is true.
P5	strParentUnique	STR	Specifies the name of the parent of the calculated member. This string is written out only if fLoadParentUnique in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadMemberName	1	=1 if strMemberName is saved after the fixed size portion of the record.
1	fLoadSourceHier	1	=1 if strSourceHier is saved after the fixed size portion of the record.
2	fLoadParentUnique	1	=1 if strParentUnique is saved after the fixed size portion of the record.
3	unused	29	Reserved

BRTENDPCDCALCMEM

Record 434, Size 0

Represents the end of a calculated OLAP member.

BRTBEGINPCDHGLEVELS

Record 435, Size 4

Represents the collection of OLAP grouping levels.

Record data

Offset Field Name Size Contents

0	clevels	4	Specifies the number of grouping levels.
---	---------	---	--

BRTENDPCDHGLEVELS

Record 436, Size 0

Represents the end of the collection of OLAP grouping levels.

BRTBEGINPCDHGLEVEL

Record 437, Variable Size

Represents the OLAP grouping level properties.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
P1	strUnique	STR	Specifies the unique name for this grouping level.
P2	strLevelName	STR	Specifies the display name for this grouping level.

The grbit1 field contains the following flags and fields:

Record data

Offset	Field Name	Bits	Contents
0	fGroupLevel	1	=1 if this is a user-defined group level.
1	fCustomRollup	1	=1 if this group level has a custom roll up.
2	unused	6	Reserved

BRTENDPCDHGLEVEL

Record 438, Size 0

Represents the end of the properties of an OLAP grouping level.

BRTBEGINPCDHGLGROUPS

Record 439, Size 4

Represents the collection of OLAP level groups.

Record data**Offset Field Name Size Contents**

0	cgroups	4	Specifies the number of level groups in the collection.
---	---------	---	---

BRTENDPCDHGLGROUPS

Record 440, Size 0

Represents the end of the collection of OLAP level groups.

BRTBEGINPCDHGLGROUP

Record 441, Size 5

Represents an OLAP level group.

Record data**Offset Field Name Size Contents**

0	iGrpNum	4	Specifies the unique number for this group within the level.
4	grbit1	1	See grbit1 description below.

P1	strName	STR	Specifies the name of this group.
P2	strUniqueName	STR	Specifies the unique name of this group.
P3	strCaption	STR	Specifies the caption of this group.
P4	strParent UniqueName	STR	Specifies the unique name of the parent of this group. This string is written out only if fLoadParentName in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadParentName	1	=1 if strParentUniqueName is saved after the fixed size portion of the record.
1	unused	7	Reserved

BRTENDPCDHGLGROUP

Record 442, Size 0

Represents the end of an OLAP level group.

BRTBEGINPCDHGLGMEMBERS

Record 443, Size 4

Represents the collection of OLAP group members.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cmembers	4	Specifies the number of group members in the collection.
---	----------	---	--

BRTENDPCDHGLGMEMBERS

Record 444, Size 0

Represents the end of the collection of OLAP group members.

BRTBEGINPCDHGLGMEMBER

Record 445, Variable Size

Represents an OLAP group member.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	fGroup	4	=1 if this member represents a group member. =0 if this member represents a level member.
P1	strUnique	STR	Specifies the unique name of this group member.

BRTENDPCDHGLGMEMBER

Record 446, Size 0

Represents the end of an OLAP group member.

BRTBEGINMGS

Record 486, Size 4

Represents the collection of PivotTable OLAP measure groups.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cmgs	4	Specifies the number of measure groups in the PivotTable.
---	------	---	---

BRTENDMGS

Record 487, Size 0

Represents the end of the collection of PivotTable OLAP measure groups.

BRTBEGINMGMAPS

Record 488, Size 4

Represents the PivotTable OLAP measure group - Dimension maps.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

0	cmaps	4	Specifies the number of measure group - dimension maps in the PivotTable.
---	-------	---	---

BRTENDMGMAPS

Record 489, Size 0

Represents the end of the PivotTable OLAP measure group - Dimension maps.

BRTBEGINMG

Record 490, Variable Size

Represents a PivotTable OLAP measure group.

Record data

Offset	Field Name	Size	Contents
--------	------------	------	----------

P1	strName	STR	Specifies the name of the measure group.
P2	strDisplay	STR	Specifies the display name of the measure group.

BRTENDMG

Record 491, Size 0

Represents the end of a PivotTable OLAP measure group.

BRTBEGINMAP

Record 492, Size 8

Represents a PivotTable OLAP measure group - Dimension map.

Record data**Offset Field Name Size Contents**

0	img	4	Specifies the identifier of the measure group (a collection of measures).
4	isxdh	4	Specifies the identifier for the dimension that exposes the measure group.

BRTENDMAP

Record 493, Size 0

Represents the end of a PivotTable OLAP measure group - Dimension map.

BRTBEGINPCDSDTCEMEMBERSSORTBY

Record 646, Size 4

Represents the beginning of "sort by" information for tuple cache members.

Record data**Offset Field Name Size Contents**

0	cmembers	4	Specifies the number of members in the collection.
---	----------	---	--

BRTENDPCDSDTCEMEMBERSSORTBY

Record 647, Size 0

Represents the end of the "sort by" information for tuple cache members.

BRTBEGINPCDSFCIENTRIES

Record 657, Size 4

Represents the beginning of the collection of numeric and currency formats specified by the OLAP server for a tuple.

Record data**Offset Field Name Size Contents**

0	centry	4	Specifies the number of formats in the collection.
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BRTENDPCDSFCIENTRIES

Record 658, Size 0

Represents the end of the collection of numeric and currency formats specified by the OLAP server for a tuple.

BRTPCDSFCIENTRY

Record 659, Variable Size

Represents the numeric or currency format specified by the OLAP server for a tuple.

Record data

Offset	Field Name	Size	Contents
0	fCurrency	1	=1 if the formatting string represents a currency format.
P1	strFmt	STR	Specifies the format string to use for all the numeric values. This string is supplied by the OLAP server. Therefore, the syntax for reading the format string depends on the server implementation. Only used when fCurrency is false.
P1	strLang	STR	Specifies a language used to determine the currency symbol to display for currency values. For example, if the culture is "en-us", the values in the application will format the values with a dollar sign. If the culture is "fr-fr" the application will format the values with a euro sign. This value conforms to the language tagging conventions of RFC 3066 and later. The pattern <language>-<REGION> is used, e.g., "en-us" or "fr-fr". Only used when fCurrency is true.

PivotCacheRecords Part

The pivotCacheRecords part represents the metadata of the record cache that supports PivotTable views and sheet data formulas. For a more detailed description of the PivotTable itself, please go to the [PivotTable part](#) documentation.

RECORD ORDER

brtBeginPivotCacheRecords [Record 193]

 brtPCRRecord [Record 33] (occurs 0 or more times)

 brtPCRRecordDt [Record 34] (occurs 0 or more times)

 brtPCDIMissing [Record 20] (occurs 0 or more times)

 brtPCDINumber [Record 21] (occurs 0 or more times)

 brtPCDIBoolean [Record 22] (occurs 0 or more times)

 brtPCDIError [Record 23] (occurs 0 or more times)

 brtPCDIString [Record 24] (occurs 0 or more times)

 brtPCDIDatetime [Record 25] (occurs 0 or more times)

 brtPCDIIndex [Record 26] (occurs 0 or more times)

 brtPCDIAMissing [Record 27] (occurs 0 or more times)

 brtPCDIANumber [Record 28] (occurs 0 or more times)

 brtPCDIABoolean [Record 29] (occurs 0 or more times)

 brtPCDIALError [Record 30] (occurs 0 or more times)

 brtPCDIAString [Record 31] (occurs 0 or more times)

 brtPCDIADatetime [Record 32] (occurs 0 or more times)

brtEndPivotCacheRecords [Record 194]

BRTBEGINPIVOTCACHEREORDS

Record 193, Size 4

Represents the beginning of the collection of records in the PivotCache.

Record data			
Offset	Field Name	Size	Contents
0	crecords	4	Specifies the number of records in the cache.

BRTENDPIVOTCACHEREORDS

Record 194, Size 0

Represents the end of the collection of records in the PivotCache.

External Data Connections Part

This part contains the descriptions of the connections to data sources outside of the workbook. PivotTables, sheet data formulas and Query Tables make use of these connections. These connection objects are independent of the objects in the spreadsheet application that display data such as tables, PivotTables, etc. The following cases make use of external connections:

- Data retrieved using ODBC
- Data retrieved using DAO
- Data retrieved using ADO
- Data retrieved using OLEDB
- Data retrieved using DSP
- Data retrieved from a web page
- Data retrieved from text files

Some information about a connection is considered part of the connection's definition. Other information is not inherently part of the connection, but it describes the way the connection is to be used by the containing workbook. Note that in many cases, the spreadsheet application does not need knowledge of the command syntax for the external data source (e.g., database query language), and simply stores a command string that was created by a data provider API (e.g., an ODBC driver).

A connection's definition can be established in a standalone connection file for easier sharing and reuse, but this reference documentation addresses the representation for external data connections that is directly embedded within the document. This embedded representation is expected whenever external data is used, and ensures portability of the document and continued operation of the external query in the most cases.

RECORD ORDER

brtBeginExtConnections [Record 429]

 brtBeginExtConnection [Record 201] (occurs 1 or more times)

 brtBeginECDbProps [Record 203] (occurs 0 to 1 times)
 (Only valid for OLEDB and ODBC connections)

 brtEndECDbProps [Record 204]

 brtBeginECOlapProps [Record 205] (occurs 0 to 1 times)
 (Only valid for OLAP connections)

 brtEndECOlapProps [Record 206]

 brtBeginECWebProps [Record 261] (occurs 0 to 1 times)
 (Only valid for web query connections)

 brtBeginECWPTables [Record 263] (occurs 0 to 1 times)

 brtPCDIMissing [Record 20] (occurs 0 or more times)

 brtPCDIIndex [Record 26] (occurs 0 or more times)

brtPCDIString [Record 24] (occurs 0 or more times)

brtEndECWPTables [Record 264]

brtEndECWebProps [Record 262]

brtBeginECTxtWiz [Record 538] (occurs 0 to 1 times)
(Only valid for text query connections)

brtBeginECTWFldInfoLst [Record 540] (occurs 0 to 1 times)

brtBeginECTWFldInfo [Record 542] (occurs 1 or more times)

brtEndECTWFldInfoList [Record 541]

brtEndECTxtWiz [Record 539]

brtBeginECPParams [Record 265] (occurs 0 to 1 times)
(Only valid for ODBC and web query connections)

brtBeginECPParam [Record 267] (occurs 1 or more times)

brtEndECPParam [Record 268]

brtEndECPParam [Record 266]

brtEndExtConnection [Record 202]

brtEndExtConnections [Record 430]

BRTBEGINEXTCONNECTION

Record 201, Variable Size

Contains both the definition of how to get at an external data source as well as information describing how the connection is used within the workbook. Specific constructs in a worksheet, such as OLAP formulas, QueryTables, or PivotTables make use of information in the connection to retrieve or refresh data based on default events or the user's explicit request.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	grbit2	4	See grbit2 description below.
8	grbit3	2	See grbit3 description below.
10	idbtype	4	Specifies the data source type. 1= ODBC-based source 2= DAO-based source 3= File based database source 4= Web query 5= OLE DB-based source 6= Text-based source 7= ADO record set 8= (Reserved) 9= DSP

14	irecontype	4	<p>Specifies what the spreadsheet application should do when a connection fails.</p> <p>1= As required: On refresh use the existing connection information and if it ends up being invalid then get updated connection information, if available from the external connection file.</p> <p>2= Always: On every refresh get updated connection information from the external connection file, if available, and use that instead of the existing connection information. In this case the data refresh will fail if the external connection file is unavailable.</p> <p>3= Never: Never get updated connection information from the external connection file even if it is available and even if the existing connection information is invalid.</p>
18	dwConnID	4	Specifies the unique identifier of this connection.
22	iCredMethod	1	<p>Specifies the authentication method to be used when establishing (or re-establishing) the connection.</p> <p>0= Integrated – integrated authentication</p> <p>1= None – use no credentials at all</p> <p>2= Stored – use stored credentials</p> <p>3= Prompt – prompt for credentials</p>
P1	strSource DataFile	STR	<p>Path to the file to use to import external data. May be expressed in URI or system-specific file path notation.</p> <p>This string is written out only if <code>fLoadSourceDataFile</code> in <code>grbit3</code> is true.</p>
P2	strSource ConnectionFile	STR	<p>Specifies the full path to the external connection file from which this connection was created. If a connection fails during an attempt to refresh data, and <code>irecontype</code>=1, then the spreadsheet application will try again using information from the external connection file instead of the connection object embedded within the workbook.</p> <p>This is a benefit for data source and spreadsheet document manageability. If the definition in the external connection file is changed (e.g., because of a database server name change), then the workbooks that made use of that connection will fail to connect with their internal connection information, and reload the new connection information from this file.</p> <p>This member is cleared by the spreadsheet application when the user manually edits the connection definition within the workbook. May be expressed in URI or system-specific file path notation.</p> <p>This string is written out only if <code>fLoadSourceConnectionFile</code> in <code>grbit3</code> is true.</p>
P3	strConnection Desc	STR	Specifies the user description for this connection. This string is written out only if <code>fLoadConnectionDesc</code> in <code>grbit3</code> is true.

P4	strConnectionName	STR	Specifies the name of the connection. Each connection must have a unique name. This string is written out only if <code>fLoadConnectionName</code> in <code>grbit3</code> is true.
P5	strSSOApplicationID	STR	<p>When a connection has been marked as deleted and then a new connection is added with the same name, the deleted connection is replaced with the new connection.</p> <p>Identifier for Single Sign On (SSO) used for authentication between an intermediate spreadsheet server and the external data source. This string is written out only if <code>fLoadSSOApplicationID</code> in <code>grbit3</code> is true.</p> <p>Note: Data connectivity can use a number of different technologies. One example of potential values stored in this attribute can be found at: http://msdn2.microsoft.com/en-us/library/microsoft.sharepoint.portal.singlesignon.ssoreturncodes_members.aspx</p>

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	bVerRefreshed	8	<p>For backward compatibility purposes, this member indicates the version of the spreadsheet application that last refreshed the connection. This attribute applies to connections that are used by a QueryTable.</p> <p>For Excel one of the following:</p> <ul style="list-style-type: none"> 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
8	bVerRefreshedMin	8	<p>For compatibility with legacy spreadsheet applications. This represents the minimum version number that is required to be able to correctly refresh the data connection. This attribute applies to connections that are used by a QueryTable.</p> <p>For Excel one of the following:</p> <ul style="list-style-type: none"> 0= Excel 9 (2000) and earlier 1= Excel 10 (XP) 2= Excel 11 (2003) 3= Excel 12 (2007)
16	pc	8	=1 if the password is to be saved as part of the connection string.
24	unused	8	Reserved

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	wInterval	16	Specifies the number of minutes between automatic refreshes of the connection.

16	fMaintain	1	=1 if the spreadsheet application should make efforts to keep the connection open. =0 if the application should close the connection after retrieving the information. This corresponds to the MaintainConnection property of a PivotCache object.
17	fNewQuery	1	=1 if the connection has not been refreshed for the first time. This state can happen when the user saves the file before a query has finished.
18	fDeleted	1	=1 if the connection has been deleted. Deleted connections contain only the members strConnectionName and fDeleted=true; all other information is removed from the file. If a new connection is created with the same name as a deleted connection, then the deleted connection is overwritten by the new connection.
19	fAlwaysUse Connection File	1	=1 if the application should always and only use the connection information in the external connection file indicated by the strSourceConnectionFile member when the connection is refreshed. =0 if the spreadsheet application should follow the procedure indicated by the irecontype member described above.
20	fBackground dQuery	1	Applies only to OLE DB and ODBC connections, this attribute is ignored for other types of connections. =1 if the preferred usage of the connection is to refresh asynchronously in the background. =0 if the preferred usage of the connection is to refresh synchronously in the foreground.
21	fRefreshOn Load	1	This flag should be intentionally ignored in specific cases. An example of when the flag would be ignored is in the case of a connection to OLAP data on Microsoft SQL Server Analysis Services, where the connection is used by both a PivotTable and also by CUBE functions within the workbook. That connection will always be refreshed synchronously by the PivotTable and will always be refreshed asynchronously by the CUBE functions.
22	fSaveData	1	=1 if the external data fetched over the connection to populate a table is to be saved with the workbook.
23	unused	9	Reserved

The grbit3 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadSource DataFile	1	=1 if strSourceDataFile is saved after the fixed size portion of the record.
1	fLoadSource ConnectionFile	1	=1 if strSourceConnectionFile is saved after the fixed size portion of the record.
2	fLoadConnection Desc	1	=1 if strConnectionDesc is saved after the fixed size portion of the record.
3	fLoadConnection Name	1	=1 if strConnectionName is saved after the fixed size portion of the record.
4	fLoadSSO ApplicationID	1	=1 if strSSOApplicationID is saved after the fixed size portion of the record.
5	unused	11	Reserved

BRTENDEXTCOMM

Record 202, Size 0

The end of the connection definition.

BRTBEGINECDBPROPS

Record 203, Variable Size

Stores properties associated with an ODBC or OLE DB external data connection.

Record data

Offset Field Name Size Contents

0	icmdtype	4	Specifies the OLE DB command type. One of the following: =1 Query specifies a cube name =2 Query specifies a SQL statement =3 Query specifies a table name =4 Query specifies that default information has been given, and it is up to the provider how to interpret. =5 Query is against a web-based List Data Provider.
4	grbit1	1	See grbit1 description below.

P1 strConn STR The connection string is used to make contact with an OLE DB or ODBC data source. These can be constructed in a variety of ways (from UI wizards built into the data provider code, to external query applications, to advanced users editing text files). The spreadsheet application need not understand the connection syntax at all; it can simply pass the command string to the data provider API in order to re-establish a connection with the external data source.

Examples:

ODBC connection string to a database:

```
connection="DRIVER=SQL  
Server;SERVER=example_server;UID=example_useralias;  
APP=Microsoft Office  
2007;WSID=user_alias;Trusted_Connection=Yes"
```

OLE DB connection string to an Oracle database:

```
connection="Provider=OraOLEDB.Oracle.1;Password=exam  
ple_password;Persist Security Info=True;User  
ID=example_useralias;Data  
Source=example_server;Extended  
Properties="";"
```

Note: Data connectivity can use a number of different technologies.

Connection strings syntaxes are specific to individual ODBC or OLE DB data provider drivers.

P2 strCmd STR The string containing the database command to pass to the data provider API that will interact with the external source in order to retrieve data. These strings can be constructed in a variety of ways (from simple UIs built into the spreadsheet application for browsing and choosing tables and fields, to external applications providing user interface to build up complex queries, to advanced users editing text queries). The spreadsheet application need not understand the command syntax; it can simply pass the command string to the data provider API in order to retrieve the latest external data.

Example1:

Data connectivity can use a number of different technologies. The following is one example of an ODBC command string of CommandType=2 (for a Microsoft SQL Server database):

```
command="SELECT Orders.OrderID, Orders.OrderDate,
Orders.ShipName, Orders.ShipAddress, Orders.ShipCity,
Orders.ShipRegion, Orders.ShipPostalCode,
Orders.ShipCountry FROM Northwind.dbo.Orders Orders
WHERE (Orders.ShipCountry=?)"
```

Note: the "?" syntax in the string is something that the ODBC data provider is aware of and may replace with a parameter before execution. end note

Example2:

Data connectivity can use a number of different technologies. The following is one example of an OLE DB command string of CommandType=3 (for an Oracle database):

```
command=""TESTDB"."ShippersTable""
```

Note: Data connectivity can use a number of different technologies.

This string is written out only if fLoadCmd in grbit1 is true. P3 strCmdSvr STR Specifies a second command text string that is persisted when PivotTable server-based page/report fields are in use.

For ODBC connections, strCmdSvr is usually a broader query than strCmd (no WHERE clause is present in the former). Based on these two commands, parameter UI can be populated and parameterized queries can be constructed.

This string is written out only if fLoadCmdSvr in grbit1 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadCmdSvr	1	=1 if strCmdSvr is saved after the fixed size portion of the record.
1	fLoadCmd	1	=1 if strCmd is saved after the fixed size portion of the record.
2	unused	6	Reserved

BRTENDECDBPROPS

Record 204, Size 0

The end of the store for the properties associated with an ODBC or OLE DB external data connection.

BRTBEGINECOLAPPROPS

Record 205, Variable Size

Contains the properties specific to an OLAP data connection. OLE DB for OLAP is the data provider, and OLAP connections contain both the BRTBEGINECDBPROPS and BRTBEGINECOLAPPROPS records.

Note: Data connectivity can use a number of different technologies

Record data			
Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	nDrillthroughRows	4	Maximum number of drill-through rows to return when the user drills through an aggregate value in a PivotTable.
5	grbit2	1	See grbit2 description below.
P1	strConnLocal	STR	Specifies a connection string to use when a local cube is available. This string is written out only if fLoadConnLocal in grbit2 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLocalConn	1	Flag indicating whether we should get data from the local cube on refresh versus the original data source. =1 if a local cube has been created for OLAP data, and it should be used instead of the server.
1	fNoRefreshCube	1	Flag indicating whether we should refresh the local cube from the original data source. =0 if the original OLAP data source is queried each time the user explicitly refreshes the data in the application, and a new local cube is constructed from this query.

2	fSrvFmtBack	1	=1 if a PivotTable based on an OLAP source should format the data and aggregate cells in the PivotTable view using the background color from the OLAP source if this information is available. =0 if OLAP server background fill colors are ignored, and standard formatting rules within the worksheet are followed.
3	fSrvFmtFore	1	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the font color from the OLAP source. =0 if OLAP server font colors are ignored, and standard formatting rules within the worksheet are followed.
4	fSrvFmtFlags	1	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the font from the OLAP source (e.g., Arial or Tahoma). =0 if OLAP server fonts are ignored, and standard formatting rules within the worksheet are followed.
5	fSrvFmtNum	1	=1 if a PivotTable based on OLAP source should format the data and aggregate cells in the PivotTable view using the number format from the OLAP source. =0 if OLAP server number formats are ignored, and standard formatting rules within the worksheet are followed.
6	fUseOfficeLcid	1	=1 if the app should send the user interface locale ID to the OLAP provider to retrieve localized member names and properties, etc.
7	unused	1	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLoadConnLocal	1	=1 if strConnLocal is saved after the fixed size portion of the record
1	unused	7	Reserved

BRTENDECOLAPPROPS

Record 206, Size 0

The end of the container for the properties needed for an OLAP data connection.

BRTBEGINECWEBPROPS

Record 261, Variable Size

Specifies the properties for a web query source. A web query will retrieve data from HTML tables, and can also supply HTTP "Get" parameters to be processed by the web server in generating the HTML by including the parameters and parameter elements.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.

4	grbit2	1	See grbit2 description below.
P1	strURL	STR	URL to use to refresh external data. This string is written out only if fLoadUrl in grbit2 is true.
P2	strWebPost	STR	Returns or sets the string used with the post method of inputting data into a web server to return data from a web query. This string is written out only if fLoadWebPost in grbit2 is true.
P3	strEditWebPage	STR	The URL of the user-facing web page showing the web query data. This URL is persisted in the case that fImportXMLSource in grbit1 is true and strURL has been redirected to reference an XML file. Then the user-facing page can be shown in the UI, and the XML data can be retrieved behind the scenes. This string is written out only if fLoadEditWebPage in grbit2 is true.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	wHTMLFmt	8	How to handle formatting from the HTML source when bringing web query data into the worksheet. Relevant when fImportXMLSource in grbit1 is true. 0= None - no formatting at all 1= RTF - honor just rich text formatting 2= All - honor all html formatting.
8	fSrcIsXML	1	=1 if the web query source is XML =0 if the web query source is HTML
9	fImportXML Source	1	=1 if the XML source data should be imported instead of the HTML table itself.
			Used when a web query exists to an HTML table with the following attribute: <TABLE ... o:WebQuerySourceHRef="http://..." ... > ... </TABLE>
10	fParsePre Formatted	1	=1 if the data contained within HTML <PRE> tags in the web page is parsed into columns when you import the page into a query table.
11	fConsecDelim	1	=1 if consecutive delimiters should be treated as just one delimiter.
12	fSameSettings	1	=1 if the app will parse all tables inside a <PRE> block with the same width settings as the first row.
13	fXL97Format	1	=1 if this web query was created in Microsoft Excel 97. This is an optional attribute that can be ignored.
14	fNoDateRecog	1	=1 if dates should be imported into cells in the worksheet as text rather than dates.
15	fRefreshedInXL9	1	=1 if this web query was refreshed in a spreadsheet application newer than or equal to Microsoft Excel 2000. This is an optional attribute that can be ignored.
16	fTablesOnlyHTML	1	=1 if web queries should only work on HTML tables.
17	unused	15	Reserved

The `grbit2` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fLoadWebPost</code>	1	=1 if <code>strWebPost</code> is saved after the fixed size portion of the record.
1	<code>fLoadEditWebPage</code>	1	=1 if <code>strEditWebPage</code> is saved after the fixed size portion of the record.
2	<code>fLoadUrl</code>	1	=1 if <code>strUrl</code> is saved after the fixed size portion of the record.
3	<code>unused</code>	5	Reserved

BRTENDECWEBPROPS

Record 262, Size 0

Specifies the end of the properties for a web query source.

BRTBEGINCWPTABLES

Record 263, Size 4

Represents the collection of tables to be returned via a web query data connection. Tables are most commonly referenced by their indices (in order of the `<Table>` tags in the HTML page) using [BRTPCDIINDEX](#) records.

Record data

Offset	Field Name	Size	Contents
---------------	-------------------	-------------	-----------------

0	<code>ctables</code>	4	Number of tables to pull data from when refreshing from a web query.
---	----------------------	---	--

BRTENDECWPTABLES

Record 264, Size 0

The end of the collection of tables to be returned via a web query data connection.

BRTBEGINCPARAMS

Record 265, Size 4

Represents a collection of parameters for an ODBC or web query.

Record data

Offset	Field Name	Size	Contents
---------------	-------------------	-------------	-----------------

0	<code>cparams</code>	4	The number of parameters in the collection.
---	----------------------	---	---

BRTENDECPARAMS

Record 266, Size 0

Serves as the end of the collection of parameters for an ODBC or web query.

BRTBEGINCPARAM

Record 267, Variable Size

Stores properties about a parameter used with external data connections. Parameters are used to change the query executed externally and cause different data to be retrieved into the workbook. The type of parameter used – see pbt in grbit1 – determines whether the user will be prompted for a value before data is refreshed, or the value will be pulled from a cell in the workbook, or whether the same value should be used until explicitly changed in the data connection. Parameters are valid for ODBC and web queries.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	wTypeSql	2	SQL data type of the parameter. Only valid for ODBC sources. See end note for supported values. ^{xii}
4	dwDataType	4	This member is written out only if pbt in grbit1 equals one.
4	fLoadPrompt	4	This member is written out only if pbt in grbit1 equals two.
P1	strName	STR	The name of the parameter.
P2	strVal	STR	String value to use as the query parameter. This string is written out only if pbt in grbit1 equals one and dwDataType equals two.
P2	numVal	8	Numeric value to use as the query parameter. This value is written out only if pbt in grbit1 equals one and dwDataType is one or 2048.
P2	FMLA	FMLA	Cell reference indicating which cell's value to use for the query parameter. This fmla is written out only if pbt in grbit1 equals two.
P2	strPrompt	STR	Prompt string for the parameter. Presented to the spreadsheet user along with input UI to collect the parameter value before refreshing the external data. This string is written out only if pbt in grbit1 equals zero and fLoadPrompt is true.
P2	fVal	1	Boolean value to use as the query parameter. This value is written out only if pbt in grbit1 equals one and dwDataType is four.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	pbt	3	Type of parameter used. One of the following: 0= if the parameter value is prompted for. 1= if the parameter value is a boolean, double, integer, or string. 2= if the parameter value is the result of a formula.
3	fAutoRefresh	1	=1 if external data is refreshed using the new value when the result of the formula changes. =0 if external data is only refreshed when requested by the user, or some other event triggers refresh (e.g., workbook opened).
4	unused	12	Reserved

BRTENDECPARAM

Record 268, Size 0

The end of the container for the properties stored for parameters used with external data connections.

BRTBEGINEXTCONNECTIONS

Record 429, Size 0

The beginning of the container for the individual connection objects.

BRTENDEXTCONNECTIONS

Record 430, Size 0

The end of the container for the individual connection objects.

BRTBEGINEXTTWIZ

Record 538, Variable Size

Contains all of the text import properties.

Record data

Offset	Field Name	Size	Contents
0	grbit1	4	See grbit1 description below.
4	chCustom	2	User-specified character to be treated as a field delimiter. Only single characters are supported.
6	rowStartAt	4	Indicates at what row of the file to start the data import. All unsignedInt values are valid, although it's possible that rowStartAt will be higher than the number of rows in the text file, in which case no data will be imported.

10 chDecimal 1 The decimal separator character. This and the `chThousSep` member are used only when data in the text file contains decimal and thousands separators that are different from those used on the computer, due to a different language setting being used.

The following table shows the results when you import text into a spreadsheet application using various separators. Numeric results are displayed in the rightmost column.

<i>System decimal</i>	<i>System thousands</i>	<i>Text file decimal</i>	<i>Text file thousands</i>	<i>Text imported</i>
Period	Comma	Comma	Period	123.123,45
Period	Comma	Comma	Comma	123.123,45
Comma	Period	Comma	Period	123,123.45
Period	Comma	Period	Comma	123 123.45
Period	Comma	Period	Space	123 123.45

11 chThousSep 1 Only single characters are supported.
The thousands separator character. This and the `chDecimal` member are used only when data in the text file contains decimal and thousands separators that are different from those used on the computer, due to a different language setting being used. Please refer to the `chDecimal` member description above for a Table describing the behavior.

P1 strFile STR Only single characters are supported.
Path to the text file to use to import external data. May be expressed in URI or system-specific file path notation. This string is written only if `fFile` in `grbit1` is true.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	iCpid	2	Ignorable member that determines the kind of character set to use during import. One of the following: 0= Macintosh 1= Windows (ANSI) 2= MS-DOS (PC-8)
2	iCpidNew	10	Only one of <code>iCpid</code> and <code>iCpidNew</code> should be specified in this record.
12	fDelimited	1	=1 if the file is tab or character delimited. =0 if the file should be parsed according to fixed length fields.

13	fTab	1	=1 if tabs will be used as field delimiters.
14	fSpace	1	=1 if space characters will be used as field delimiters.
15	fComma	1	=1 if comma characters will be used as field delimiters.
16	fSemiColon	1	=1 if semicolon characters will be used as field delimiters.
17	fConsecutive	1	=1 if consecutive delimiters should be treated as just one delimiter.
18	iTextDelm	2	Character used as the text string qualifier. 0= Quotation mark 1= Apostrophe 2= None 3= None
20	fFile	1	=1 if <code>strFile</code> is saved after the fixed size portion of the record.
21	fPromptForFile	1	=1 if the user wants to be prompted for the file name on refresh.
22	fCustom	1	=1 if the custom delimiter (<code>chCustom</code>) character should be used as a field delimiter.
23	unused	9	Reserved

BRTENDECTXTWIZ

Record 539, Size 0

The end of the container all of the text import settings.

BRTBEGINCTWFLDINFOLST

Record 540, Size 4

Represents the beginning of a collection of fields in a text file.

Record data			
Offset	Field Name	Size	Contents
0	cFields	4	Number of fields in the collection.

BRTENDECTWFLDINFOLST

Record 541, Size 0

Denotes the end of a set of fields to retrieve from a text file.

BRTBEGINCTWFLDINFO

Record 542, Size 8

Specifies field settings for text import.

Record data			
Offset	Field Name	Size	Contents
0	fieldType	4	<p>Specifies the field Type. When text is imported into cells in the worksheet, the data in the cells are converted to the type defined here. Types can be specified by the user, or determined algorithmically via heuristics and text analysis.</p> <p>0= General: application decides if there is any special handling needed.</p> <p>1= Text: field contains strings.</p> <p>2= MDY: Field contains a date in the order: month, day, year.</p> <p>3= DMY: Field contains a date in the order: day, month, year.</p> <p>4= YMD: Field contains a date in the order: year, month, day.</p> <p>5= MYD: Field contains a date in the order: month, year, day.</p> <p>6= DYM: Field contains a date in the order: day, year, month.</p> <p>7= YDM: Field contains a date in the order: year, day, month.</p> <p>8= Skip: Don't import this field at all.</p> <p>9= EMD: Field contains an East Asian date in the order: EA era year, month, day.</p>
4	fieldStart	4	<p>The character position the field starts at for fixed-length fields. The index is 0-based. Subsequent BRTBEGINCTWFLDINFO records or carriage returns in the text stream serve to denote endpoints for text fields.</p>

Shared Records: PCDI

These records contain PivotCache item information. The PCDI records are shared between the PivotCache Definitions, PivotCache Records, and External Connections parts.

BRTPCDIMISSING

Record 20, Size 0

Represents a Pivot missing value/item.

BRTPCDINUMBER

Record 21, Size 8

Represents a Pivot numeric value/item.

Record data

Offset	Field Name	Size	Contents
0	num	8	Specifies the value of this numeric Pivot item. This value is of type NUM.

BRTPCDIBOOLEAN

Record 22, Size 1

Represents a Pivot boolean value.

Record data

Offset	Field Name	Size	Contents
0	f	1	Represents a Pivot Boolean value/item.

BRTPCDIERROR

Record 23, Size 1

Represents a Pivot error value/item.

Record data

Offset	Field Name	Size	Contents
0	err	1	Represents a Pivot error value/item, which is one of the following: 0= #NULL! (a null range reference) 7= #DIV0! (divide by zero) 15= #VALUE! (an invalid value) 23= #REF! (an invalid cell reference) 29= #NAME? (an unrecognized name/label) 36= #NUM! (an invalid number) 42= #N/A (no value available)

BRTPCDISTRING

Record 24, Variable Size

Represents a Pivot string value/item.

Record data

Offset	Field Name	Size	Contents
0	str	STR	Specifies the value of this string Pivot item.

BRTPCDIDATETIME

Record 25, Size 8

Represents a Pivot date-time value/item that contains additional data.

Record data

Offset	Field Name	Size	Contents
0	yr	2	Represents a four digit year.
2	mon	2	Represents a month index (1-12).
4	dom	1	Represents a day of the month (1-31).
5	hr	1	Represents an hour of the day (0-23).
6	min	1	Represents a minute (0-59).
7	sec	1	Represents a second (0-59).

BRTPCDIINDEX

Record 26, Size 4

Represents a PivotCache item index.

Record data

Offset	Field Name	Size	Contents
0	iitem	4	An unsigned int representing a PivotCache item index.

BRTPCDIAMISSING

Record 27, Variable Size

Represents a Pivot missing value/item that contains additional data.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below
P1	strCaption	STR	The Pivot item's caption string. Written out only if fCaption in grbit1 is true.
P2	rgimemprops	RG 4	A sequence of ints representing member property indexes.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhost	1	=1 if the Pivot item isn't present in the data source currently.
1	fFmla	1	=1 if the Pivot item was generated for a calculated item.
2	fCaption	1	=1 if a caption string (<code>strCaption</code>) is saved after the fixed size portion of the record.
3	unused	13	Reserved

BRTPCDIANUMBER

Record 28, Variable Size

Represents a Pivot numeric value/item that contains additional data.

Record data			
Offset	Field Name	Size	Contents
0	num	8	Specifies the value of this numeric PivotCache item. This value is of type NUM.
8	grbit1	2	See <code>grbit1</code> description below
P1	strCaption	STR	The Pivot item's caption string. Written out only if <code>fCaption</code> in <code>grbit1</code> is true.
P2	rgimemprops	RG 4	A sequence of ints representing member property indexes.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhost	1	=1 if the Pivot item isn't present in the data source currently.
1	fFmla	1	=1 if the Pivot item was generated for a calculated item.
2	fCaption	1	=1 if a caption string (<code>strCaption</code>) is saved after the fixed size portion of the record.
3	unused	13	Reserved

BRTPCDIABOOLEAN

Record 29, Variable Size

Represents a Pivot boolean value/item that contains additional data.

Record data			
Offset	Field Name	Size	Contents
0	f	1	Represents a Pivot Boolean value/item.
1	grbit1	2	See <code>grbit1</code> description below
P1	strCaption	STR	The Pivot item's caption string. Written out only if <code>fCaption</code> in <code>grbit1</code> is true.
P2	rgimemprops	RG 4	A sequence of ints representing member property indexes.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhost	1	=1 if the Pivot item isn't present in the data source currently.
1	fFmla	1	=1 if the Pivot item was generated for a calculated item.
2	fCaption	1	=1 if a caption string (strCaption) is saved after the fixed size portion of the record.
3	unused	13	Reserved

BRTPCDIAERROR

Record 30, Variable Size

Represents a Pivot error value/item that contains additional data.

Record data

Offset	Field Name	Size	Contents
0	err	1	Represents a Pivot error value/item, which is one of the following: 0= #NULL! (a null range reference) 7= #DIV0! (divide by zero) 15= #VALUE! (an invalid value) 23= #REF! (an invalid cell reference) 29= #NAME? (an unrecognized name/label) 36= #NUM! (an invalid number) 42= #N/A (no value available)
1	grbit1	2	See grbit1 description below
P1	strCaption	STR	The Pivot item's caption string. Written out only if fCaption in grbit1 is true.
P2	rgimemprops	RG 4	A sequence of ints representing member property indexes.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhost	1	=1 if the Pivot item isn't present in the data source currently.
1	fFmla	1	=1 if the Pivot item was generated for a calculated item.
2	fCaption	1	=1 if a caption string (strCaption) is saved after the fixed size portion of the record.
3	unused	13	Reserved

BRTPCDIASTRING

Record 31, Variable Size

Represents a Pivot string value/item that contains additional data.

Record data			
Offset	Field Name	Size	Contents
0	str	STR	Specifies the value of this string PivotCache item.
P1	grbit1	2	See grbit1 description below
P2	strCaption	STR	The Pivot item's caption string. Written out only if fCaption in grbit1 is true.
P3	rgimemprops	RG 4	A sequence of ints representing member property indexes.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhost	1	=1 if the Pivot item isn't present in the data source currently.
1	fFmla	1	=1 if the Pivot item was generated for a calculated item.
2	fCaption	1	=1 if a caption string (strCaption) is saved after the fixed size portion of the record.
3	unused	13	Reserved

BRTPCDIADATETIME

Record 32, Variable Size

Represents a Pivot date-time value/item that contains additional data.

Record data			
Offset	Field Name	Size	Contents
0	yr	2	Represents a four digit year.
2	mon	2	Represents a month index (1-12).
4	dom	1	Represents a day of the month (1-31).
5	hr	1	Represents an hour of the day (0-23).
6	min	1	Represents a minute (0-59).
7	sec	1	Represents a second (0-59).
8	grbit1	2	See grbit1 description below
P1	strCaption	STR	The Pivot item's caption string. Written out only if fCaption in grbit1 is true.
P2	rgimemprops	RG 4	A sequence of ints representing member property indexes.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fGhost	1	=1 if the Pivot item isn't present in the data source currently.
1	fFmla	1	=1 if the Pivot item was generated for a calculated item.
2	fCaption	1	=1 if a caption string (strCaption) is saved after the fixed size portion of the record.
3	unused	13	Reserved

BRTPCRRECORD

Record 33, Variable Size

Represents one record in the PivotCache.

Record data

Offset	Field Name	Size	Contents
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0	rgb	RGB	Represents one record in the PivotCache through a sequence of Pivot items all stored within this one record. No data types are specified with the Pivot items since each Pivot item is of the default data type for its corresponding Pivot field. The Pivot items appear within the sequence in the same order as the Pivot fields are loaded from the file. See BRTPCDIBOOLEAN , BRTPCDIDATETIME , BRTPCDIERROR , BRTPCDIINDEX , BRTPCDINUMBER , and BRTPCDISTRING for the organization of each Pivot item data type.
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BRTPCRRECORDDT

Record 34, Size 0

Represents the beginning of a collection of Pivot item records that describe one record in the PivotCache.

See [BRTPCDIBOOLEAN](#), [BRTPCDIDATETIME](#), [BRTPCDIERROR](#), [BRTPCDIINDEX](#), [BRTPCDINUMBER](#) and [BRTPCDISTRING](#) for the organization of each Pivot item record that can occur.

BRTBEGINPCDIRUN

Record 191, Variable Size

A sequence of Pivot items all of the same data type.

Record data

Offset	Field Name	Size	Contents
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0	mdSxoper	2	The data type of the sequence of Pivot items. One of the following: 1= Numbers 2= Strings 4= Booleans 16= Excel error values 32= Dates 256= Nil (no value)
2	rgitems	RG	A collection of Pivot items in the sequence. The size of each record in the sequence is dependent on the data type: Numbers – see BRTPCDINUMBER Strings – see BRTPCDISTRING Booleans – see BRTPCDIBOOLEAN Excel error values – see BRTPCDIERROR Dates – see BRTPCDIDATETIME Nil – see BRTPCDIMISSING

BRTENDPCDIRUN

Record 192, Size 0

The end of a sequence of Pivot items all of the same data type.

Shared Records: PivotRule

The PivotRule provides a way to describe an area or part of the PivotTable view with the benefit that the PivotRule will adapt or update as the user pivots the PivotTable view. For instance if the user has a field named "State" that is showing in the row area of the PivotTable view and they format the field with a red background and then pivot the "State" field to the column area the red background will follow the pivot and still show on the "State" field.

The PivotRule is used by several features and can appear in more than one part. Here's a list of features that currently make use of a PivotRule:

- PivotTable selection
- PivotTable calculated items
- PivotTable adhoc formatting
- PivotTable conditional formatting
- PivotTable auto sort scope
- PivotChart adhoc formatting

RECORD ORDER

`brtBeginPRule` [Record 247]

`brtBeginPRFilters` [Record 249] (Occurs 0 or more times)

`brtBeginPRFilter` [Record 251] (Occurs 1 or more times)

`brtBeginPRFitem` [Record 382] (Occurs 0 or more times)

`brtEndPRFitem` [Record 383]

`brtEndPRFilter` [Record 252]

`brtEndPRFilters` [Record 250]

`brtEndPRule` [Record 248]

BRTBEGINRULE

Record 247, Variable Size

Describes a PivotTable area or part (also referred to as a selection).

Record data			
Offset	Field Name	Size	Contents
0	isxvd	4	Index of the field that this selection rule refers to.
4	grbit1	4	See <code>grbit1</code> description below.
P1	refLoc	16	A <code>REF</code> reference that specifies a subset of the selection area. Points are relative to the top left of the selection area. This reference is written only if <code>fPart</code> in <code>grbit1</code> is set to true.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	isxrtype	8	Indicates the type of selection rule. =0 No selection =1 Normal (refers to a header or item) =2 Data (refers to something in the data area) =3 All (refers to the whole PivotTable) =4 Origin (refers to the blank cells at the top-left of the PivotTable) =5 Button (refers to a Pivot field button) =6 Top right (refers to the blank cells at the top-right of the PivotTable)
8	fDataOnly	1	=1 if only the data values (in the data area of the view) for an item selection are selected and does not include the item labels.
9	fLabelOnly	1	=1 if only the item labels for an item selection are selected and does not include the data values (in the data area of the view).
10	fGrandRw	1	=1 if the row grand total is included in the selection.
11	fGrandCol	1	=1 if the column grand total is included in the selection.
12	fCacheBased	1	=1 if the field and item indexes refer to fields or items in the Pivot cache. =0 if the field and item indexes refer to fields or items in the PivotTable view.
13	fLineMode	1	=1 if the rule refers to an area that is in outline mode.
14	fPart	1	=1 if only a portion of an entire area is selected; refLoc indicates the exact subarea.
15	fFuzzy	1	=1 if collapsed levels/dimensions are considered subtotals.
16	sxaxis	4	The region of the PivotTable to which this rule applies. =1 Row area =2 Column area =4 Report/page area =8 Data area
20	iDimAct	8	Position of the field within the axis to which this rule applies.
28	unused	4	Reserved

BRTENDPRULE

Record 248, Size 0

The end of the rule describing a PivotTable area or part.

BRTBEGINPRLFILTERS

Record 249, Size 4

Represents the collection of the set of selected fields and the selected items within those fields.

Record data			
Offset	Field Name	Size	Contents
0	cfilters	4	Specifies the number of sets of selected fields and selected items within those fields.

BRTENDPRFILTERS

Record 250, Size 0

Represents the end of the collection of the sets of selected fields and the selected items within those fields.

BRTBEGINPRFILTER

Record 251, Size 11

Represents a selected field and the selected items within that field.

Record data			
Offset	Field Name	Size	Contents
0	isxvd	4	Specifies the index of the field to which this filter refers. A value of -2 indicates the 'data' field.
4	citems	4	Specifies the number of item indexes in the collection of indexes (BRTBEGINPRFITEM records).
8	grbit1	2	See grbit1 description below.
10	grbit2	1	See grbit2 description below.

The [grbit1](#) field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fItmtypeDefault	1	=1 if the default subtotal is included in the filter.
1	fItmtypeSum	1	=1 if the sum aggregation function is included in the filter.
2	fItmtypeCountA	1	=1 if the count all aggregation function is included in the filter.
3	fItmtypeAverage	1	=1 if the average aggregation function is included in the filter.
4	fItmtypeMax	1	=1 if the maximum aggregation function is included in the filter.
5	fItmtypeMin	1	=1 if the minimum aggregation function will is included in the filter.
6	fItmtypeProduct	1	=1 if the product aggregation function will is included in the filter.
7	fItmtypeCount	1	=1 if the count nums aggregation function will is included in the filter.
8	fItmtypeStdev	1	=1 if the standard deviation aggregation function is included in the filter.
9	fItmtypeStdevP	1	=1 if the population standard deviation aggregation function is included in the filter.
10	fItmtypeVar	1	=1 if the variance aggregation function will is included in the filter.

11	fItmtypeVarP	1	=1 if the population variance aggregation function will be included in the filter.
12	unused	4	Reserved

The grbit2 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fSelected	1	This attribute is used when the PivotTable is in Outline view. It is also used when both header and data cells have selection. =1 if the field has selection.
1	fPhysical	1	=1 if the item is referred to by position. =0 if the item is referred to by index.
2	fRelative	1	This attribute is used if fPhysical is set to true. =1 if the item is referred to by a relative reference. =0 if the item is referred to by an absolute reference.
3	unused	5	Reserved

BRTENDPRFILTER

Record 252, Size 0

Represents the end of a selected field and the selected items within that field.

BRTBEGINPRFITEM

Record 382, Size 4

Represents a Pivot item.

Record data

Offset	Field Name	Size	Contents
0	iitem	4	Specifies the index into the shared/unique items table in the PivotCache that identifies this item.

BRTENDPRFITEM

Record 383, Size 0

Represents the end of a Pivot item.

Shared Records: AutoFilter

AutoFilter temporarily hides rows based on filter criteria, which is applied column by column to a table of data in the worksheet. These records express AutoFilter settings.

RECORD ORDER

`brtBeginAfilter [Record 161]`

`brtBeginFilterColumn [Record 163]` (occurs 0 or more times)

0 to 1 of the following 6 items:

`brtDynamicFilter [Record 171]` (occurs 0 to 1 times)

`brtTop10Filter [Record 170]` (occurs 0 to 1 times)

`brtColorFilter [Record 168]` (occurs 0 to 1 times)

`brtIconFilter [Record 169]` (occurs 0 to 1 times)

`brtBeginCustomFilters [Record 172]` (occurs 0 to 1 times)

`brtBeginFilters [Record 165]` (occurs 0 to 1 times)

If `brtBeginCustomFilters` is used, then also:

`brtCustomFilter [Record 174]` (occurs 1 to 2 times)

`brtEndCustomFilters [Record 173]`

If `brtBeginFilters` is used, then also:

`brtFilter [Record 167]` (occurs 0 or more times)

`brtAfilterDateGroupItem [Record 175]` (occurs 0 or more times)

`brtEndFilters [Record 166]`

`brtEndFilterColumn [Record 164]`

`<Sort State Records>` (occurs 0 to 1 times)

`brtEndAfilter [Record 162]`

BRTBEGINAFILTER

Record 161, Size 16

Marks the beginning of the AutoFilter collection

Record data

Offset Field Name Size Contents

0	ref	16	REF reference to the cell range to which the AutoFilter is applied.
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BRTENDAFILTER

Record 162, Size 0

Marks the end of the AutoFilter collection

BRTBEGINFILTERCOLUMN

Record 163, Size 6

Identifies a particular column in the AutoFilter range and specifies filter information that has been applied to this column. If a column in the AutoFilter range has no criteria specified, then there is no corresponding filter column collection expressed for that column.

Record data

Offset	Field Name	Size	Contents
0	dwCol	4	Zero-based index indicating the AutoFilter column to which this filter information applies.
4	grbit1	2	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fHideArrow	1	=1 if the AutoFilter button for this column is hidden.
1	fNoBtn	1	=1 if the filter button is not available. For example, when the cell containing the filter button is merged with another cell, the filter button may be hidden, and not drawn.
2	unused	14	Reserved

BRTENDFILTERCOLUMN

Record 164, Size 0

Marks the end of a filterColumn collection.

BRTBEGINFILTERS

Record 165, Size 8

When multiple values are chosen to filter by, or when a group of date values are chosen to filter by, this record groups those criteria together.

Record data

Offset	Field Name	Size	Contents
0	fBlank	4	=1 if filter by blank.

4	caltyp	4	Calendar type for date grouped items. Used to interpret the values in BRTAFILTERDATEGROUPITEM . This is the calendar type used to evaluate all dates in the filter column, even when those dates are not using the same calendar system / date formatting.
		1	= Gregorian (localized)
		2	= Gregorian (US)
		3	= Japanese Emperor Era
		4	= Taiwan Era
		5	= Korean Tangun Era
		6	= Hijri (Arabic Lunar)
		7	= Trai
		8	= Hebrew (Lunar)
		9	= Gregorian Middle East French
		10	= Gregorain Arabic
		11	= Gregorian Transliterated English
		12	= Gregorian Transliterated French

BRTENDFILTERS

Record 166, Size 0

The end of a group of filter criteria.

BRTFILTER

Record 167, Variable Size

This record expresses a filter criteria value.

Record data

Offset	Field Name	Size	Contents
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0	Str	STR	Filter value used in the criteria.
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BRTCOLORFILTER

Record 168, Size 8

This record specifies the color to filter by and whether to use the cell's fill or font color in the filter criteria. If the cell's font or fill color does not match the color specified in the criteria, the rows corresponding to those cells are hidden from view.

Record data

Offset	Field Name	Size	Contents
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0	dxfid	4	Style format Id.
4	fCellColor	4	=0 if filter by the cell's font color. =1 if filter by cell fill. For rich text in cells, if the color specified appears in the cell at all, it shall be included in the filter.

BRTICONFILTER

Record 169, Size 8

This record specifies the icon set and particular icon within that set to filter by. For any cells whose icon does not match the specified criteria, the corresponding rows shall be hidden from view when the filter is applied.

Record data

Offset	Field Name	Size	Contents
0	iiconset	4	Specifies which icon set is used in the filter criteria. 0= 3 Arrows 1= 3 Arrows Gray 2= 3 Flags 3= 3 Traffic Lights 1 4= 3 Traffic Lights 2 5= 3 Signs 6= 3 Symbols 7= 3 Symbols 2 8= 4 Arrows 9= 4 Arrows Gray 10= 4 Red To Black 11= 4 Rating 12= 4 Traffic Lights 13= 5 Arrows 14= 5 Arrows Gray 15= 5 Rating 16= 5 Quarters
4	iicon	4	Zero-based index of an icon in an icon set.

If the filter is by no icon, both values should be set to -1.

BRTTOP10FILTER

Record 170, Size 17

This record specifies the top N (percent or number of items) to filter by.

Record data

Offset	Field Name	Size	Contents
0	grbit1	1	See grbit1 description below.
1	numValue	8	Top or bottom value to use as the filter criteria. For example "Filter by Top 10 Percent" or "Filter by Top 5 Items".
9	numFilter	8	The actual cell value in the range which is used to perform the comparison for this filter.

The grbit1 field contains the following flags and fields:

Offset Field Name Bits Contents

0	fTop	1	=0 if filter by bottom order. =1 if filter by top order.
1	fPercent	1	=0 if filter by number of items. =1 if filter by percent value of the column.
2	fApplied	1	=1 if numFilter is available

3	unused	5	Reserved
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BRTDYNAMICFILTER

Record 171, Size 21

This collection specifies dynamic filter criteria. These criteria are considered dynamic because they can change, either with the data itself (e.g., "above average") or with the current system date (e.g., show values for "today"). For any cells whose values do not meet the specified criteria, the corresponding rows shall be hidden from view when the filter is applied.

Record data

Offset	Field Name	Size	Contents
0	cft	4	Dynamic filter type 1= Above Average 2= Below Average 8= Tomorrow 9= Today 10= Yesterday 11= Next Week 12= This Week 13= Last Week 14= Next Month 15= This Month 16= Last Month 17= Next Quarter 18= This Quarter 19= Last Quarter 20= Next Year 21= This Year 22= Last Year 23 = Year to Date 24 to 27= Q1 to Q4 28 to 39 = M1 to M12
4	grbit1	1	See grbit1 description below.
5	numValue	8	A minimum value for a dynamic filter. In NUM format. Not used for Q1 to Q4 and M1 to M12.

13	numValueMax	8	A maximum value for dynamic filter. In NUM format. Required for the values between 8 and 23 (today, yesterday, tomorrow, nextWeek, thisWeek, lastWeek, nextMonth, thisMonth, lastMonth, nextQuarter, thisQuarter, lastQuarter, nextYear, thisYear, lastYear, and yearToDate). Not used for aboveAverage, belowAverage, Q1 to Q4 and M1 to M12.
			For example, if today's date is September 22 nd , 2006, then the range for ThisWeek is the values greater than or equal to September 17 and less than September 24. In the ThisWeek range, the lower value is expressed using numValue. The higher value is expressed using numValueMax.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fApplied	1	=1 if numValueMax is available
1	unused	7	Reserved

BRTBEGINCUSTOMFILTERS

Record 172, Size 4

A collection of custom filters (at most 2).

Record data

Offset	Field Name	Size	Contents
0	fAnd	4	=0 if the two custom filters are joined by an OR. =1 if the two custom filters are joined by an AND.

BRTENDCUSTOMFILTERS

Record 173, Size 0

The end of a group of custom filter records.

BRTCUSTOMFILTER

Record 174, Variable Size

A custom AutoFilter specifies an operator and a value. There can be at most two custom filters specified, and in that case BRTCUSTOMFILTERS specifies whether the two conditions are joined by 'and' or 'or'. For any cells whose values do not meet the specified criteria, the corresponding rows shall be hidden from view when the filter is applied.

Record data			
Offset	Field Name	Size	Contents
0	vts	1	Custom filter value format 0= Filter condition not used 2= Rk number 4= IEEE number 6= String 8= Boolean or error value 12= Match all blanks 14= Match all non-blanks
1	grbitSgn	1	Comparison Code =1 if comparing with less than =2 if comparing with equals =3 if comparing with less than or equal to =4 if comparing with greater than =5 if comparing with not equal to =6 if comparing with greater than or equal to
P1	num	8	Value used in the filter criteria. This is written out only if vts is not equal to six.
P1	fCompare	1	=1 if simple string comparing. This is written out only if vts equals six.
P2	fAutoWild	1	=1 if the argument contains wild cards. This is written out only if vts equals six.
P3	str	STR	Filter criteria. This string is written out only if vts equals six (string format).

BRTAFILTERDATEGROUPITEM

Record 175, Size 24

Autofilter date group info.

Record data			
Offset	Field Name	Size	Contents
0	yr	2	Year (4 digits)
2	mon	2	Month (1-12)
4	dom	4	Day (1-31)
8	hour	2	Hour (0-23)
10	min	2	Minute (0-59)
12	sec	2	Second (0-59)
14	wdy	2	Weekday (0 – 7 for Sunday – Saturday)
16	fracsec	2	Fractions of a second
18	wRound	2	DTR rounding parameter =0 if round to seconds =1 if round to 10ths place =2 if round to 100ths place =3 if round to 1000ths place

20 dntChecked 4 Grouping level.
 =-1 if Nil
 =0 if Year
 =1 if Month
 =2 if Day
 =3 if Hour
 =4 if Minute
 =5 if Second

Shared Records: Sort State

SortState performs a sort on rows based on sort conditions which are applied column by column to a table of data in the worksheet.

RECORD ORDER

`brtBeginSortState` [[Record 530](#)]

`brtBeginSortCond` [[Record 532](#)] (occurs 0 to 64 times)

`brtEndSortCond` [[Record 533](#)]

`brtEndSortState` [[Record 531](#)]

BRTBEGINSORTSTATE

Record 530, Size 18

This collection preserves the AutoFilter sort state.

Record data

Offset	Field Name	Size	Contents
0	<code>grbit1</code>	2	See <code>grbit1</code> description below.
2	<code>ref</code>	16	The whole <code>REF</code> range of data to sort (not just the sort-by column).

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fCol</code>	1	=1 if sort by columns. Only applies to ranges that don't have AutoFilter applied.
1	<code>fCaseSensitive</code>	1	=1 if sort is case-sensitive.
2	<code>fAltMethod</code>	1	=1 if Strokes or PinYin sort method used. Applies only to Chinese Simplified, Chinese Traditional, and Japanese application UI languages. For these languages, alternate sort methods can be selected, affecting how the data is sorted.
3	<code>unused</code>	13	Reserved

BRTENDSORTSTATE

Record 531, Size 0

The end of the collection preserving the AutoFilter sort state.

BRTBEGINSORTCOND

Record 532, Variable Size

Sort condition. When more than one sort condition is specified, the first condition is applied first, then the second condition is applied, and so on.

Record data			
Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
2	ref	16	REF reference that this sort condition applies to.
18	dxfid / iIconSet	4	Format Id when sorton in grbit1 is one or two (cell or font color). Icon set index when sorton in grbit1 is three (flag / icon).
22	iIcon	4	Zero-based index of an icon in an icon set. Used only when sorton in grbit1 is three (flag / icon).
P1	strSslist	STR	Sort by a custom list.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fSortDes	1	=1 if sort descending.
1	sorton	4	Type of sort. 0= Value 1= Cell Color 2= Font Color 3= Flag / Icon
5	unused	11	Reserved

BRTENDSORTCOND

Record 533, Size 0

The end of a sort condition.

Shared Records: Header/Footer

Header/Footer text is stored at the sheet level. Each sheet and chart object can have its own header/footer information specifying text strings for odd, even, first page. There are also some state flags. Any images placed into the header/footer are represented with the appropriate string as well as an image in the [BRTLEGACYDRAWINGHF](#) record.

HEADER/FOOTER FORMATTING CODES

All the formatting of the header/footer strings is represented with text codes. Each code is represented by a command character ("&") followed by the appropriate formatting code from below. There are some rules about what codes may appear when, but in general any new code that conflicts with a prior code 'overrides' the old code. The only exceptions are the "L" – Left section, "R" – right section, "C" – center section codes. These section codes specify which section of the header or footer is being represented (always split into left, center, right). Section codes must always be used prior to any section having any content, and they should not be repeated (i.e. you should only once have the "&L" command token). You only need to specify the section command token for any sections that have content.

Formatting Code	Description
&	Command char. Precedes every formatting token.
T	Time
D	Date
F	This workbooks filename
N	Total pages
P	Current page number
Z	This workbooks file path
G	Graphic – if present, will look for the corresponding image in BRTLEGACYDRAWINGHF.
A	Sheet tab name
+	Adds the following integer delta to the page number.
-	Subtracts the following integer delta from the page number.
B	Bold style
I	Italic style
U	Single underline style
O	Outline style
H	Shadow style
S	Strikeout style
"fontname,fonttype"	Font info where font name and font type are strings specifying the name and type of the font, separated by a comma. When a hyphen appears in font name, it means "none specified". Both of font name and font type can be localized values. The font type can be either "Bold", "Regular", "Italic", or a combination of these.
E	Double underline style
X	Superscript style
Y	Subscript style
K	Text font color – RGB color is specified as RRGGBB (in hexadecimal). Theme color is specified as TTSNNNN where TT is the theme color Id, S is either "+" or "-" of the tint/shade value, NNN is the tint/shade value.
L	"left section" (there are three header/footer locations, "left", "center", and "right").

C	"center section"
R	"right section"

RECORD ORDER

brtBeginHeaderFooter [Record 479]

brtEndHeaderFooter [Record 480]

BRTBEGINHEADERFOOTER

Record 479, Variable Size

This record specifies the header / footer information for the sheet or chart object.

Record data

Offset	Field Name	Size	Contents
0	grbit1	2	See grbit1 description below.
P1	strHeader	STR	Odd page header value. Corresponds to odd printed pages. Odd page(s) in the sheet may not be printed, for example, if the print area is specified to be a range such that it falls outside an odd page's scope. If fHFDiffOddEven is false, this field is also used for the even page header value.
P2	strFooter	STR	Odd page footer value. Corresponds to odd printed pages. Odd page(s) in the sheet may not be printed, for example, if the print area is specified to be a range such that it falls outside an odd page's scope. If fHFDiffOddEven is false, this field is also used for the even page footer value.
P3	strHeaderEven	STR	Even page header value. Only used when fHFDiffOddEven is true. Corresponds to even printed pages. Even page(s) in the sheet may not be printed, for example, if the print area is specified to be a range such that it falls outside an even page's scope. If no even header is specified, and fHFDiffOddEven is false, then odd header value is assumed for even page headers.
P4	strFooterEven	STR	Even page footer value. Only used when fHFDiffOddEven is true. Corresponds to even printed pages. Even page(s) in the sheet may not be printed, for example, if the print area is specified to be a range such that it falls outside an even page's scope. If no even footer is specified, and fHFDiffOddEven is false, then the odd footer's value is assumed for even page footers.
P5	strHeaderFirst	STR	First page header content. Only used when fHFDiffFirst is true. Corresponds to first printed page. The first logical page in the sheet may not be printed, for example, if the print area is specified to be a range such that it falls outside the first page's scope.

P6 strFooterFirst STR First page footer content. Only used when `fHFDiffFirst` is true. Corresponds to first printed page. The first logical page in the sheet may not be printed, for example, if the print area is specified to be a range such that it falls outside the first page's scope.

The `grbit1` field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	<code>fHFDiffOddEven</code>	1	=0 if only <code>strHeader</code> and <code>strFooter</code> are used; <code>strHeaderEven</code> and <code>strFooterEven</code> are ignored. =1 if <code>strHeader</code> and <code>strFooter</code> specify page header and footer values for odd pages, while <code>strHeaderEven</code> and <code>strFooterEven</code> specify page header and footer values for even pages.
1	<code>fHFDiffFirst</code>	1	=0 if <code>strHeaderFirst</code> and <code>strFooterFirst</code> are ignored. =1 if <code>strHeaderFirst</code> and <code>strFooterFirst</code> specify first page header and footer values respectively.
2	<code>fHFScaleWithDoc</code>	1	=1 if header and footer are scaled with document scaling.
3	<code>fHFAlignMargins</code>	1	=0 if header and footer margins are not aligned with the page margins. =1 if as the pages left/right margins grow and shrink, the header and footer margins stay aligned.
4	unused	12	Reserved

BRTENDHEADERFOOTER

Record 480, Size 0

This end of information that specifies the header / footer for the sheet or chart object.

Shared Records: Protection

Protection records specify options for protecting data in the workbook. Applications may use protection to prevent anyone from accidentally changing, moving, or deleting important data. This protection may be ignored by applications which choose not to support this optional protection mechanism. Note that worksheet or workbook record protection should not be confused with file security. It is not meant to make your workbook safe from unintentional modification, and cannot protect it from malicious modification.

HASH INFORMATION

All protection records contain password hashes which are used to lock specific parts of the workbook. The hash is generated from an 8-bit wide character. For password hash purposes, Unicode UTF-16 input code points are converted to an ANSI single or double byte code page using the logic defined in [UNICODE CHARACTER CONVERSION](#). The resulting value is hashed using the following algorithm:

```
// Function Input:
//      stPassword: Length prefixed string containing the password
WORD GetPasswordHash(const CHAR *stPassword)
{
    WORD wPasswordHash;
    const CHAR *pch;

    wPasswordHash = 0;
    if (stPassword[0] > 0)
    {
        pch = &stPassword[1 + stPassword[0]];
        while (pch-- != stPassword)
        {
            wPasswordHash = ((wPasswordHash >> 14) & 0x01) | ((wPasswordHash << 1) &
0x7fff);
            wPasswordHash ^= *pch;
        }
        wPasswordHash ^= (0x8000 | ('N' << 8) | 'K');
    }

    return (wPasswordHash);
}
```

UNICODE CHARACTER CONVERSION

Unicode UTF-16 input code points are converted to an ANSI single or double byte code page from the following list:

874	windows-874	ANSI/OEM Thai (same as 28605, ISO 8859-15); Thai (Windows)
932	shift_jis	ANSI/OEM Japanese; Japanese (Shift-JIS)
936	gb2312	ANSI/OEM Simplified Chinese (PRC, Singapore); Chinese Simplified (GB2312)
949	ks_c_5601-1987	ANSI/OEM Korean (Unified Hangul Code)
950	big5	ANSI/OEM Traditional Chinese (Taiwan; Hong Kong SAR, PRC); Chinese Traditional (Big5)
1250	windows-1250	ANSI Central European; Central European (Windows)
1251	windows-1251	ANSI Cyrillic; Cyrillic (Windows)
1252	windows-1252	ANSI Latin 1; Western European (Windows)
1253	windows-1253	ANSI Greek; Greek (Windows)

1254	windows-1254	ANSI Turkish; Turkish (Windows)
1255	windows-1255	ANSI Hebrew; Hebrew (Windows)
1256	windows-1256	ANSI Arabic; Arabic (Windows)
1257	windows-1257	ANSI Baltic; Baltic (Windows)
1258	windows-1258	ANSI/OEM Vietnamese; Vietnamese (Windows)

Code points with no representation in the target code page are replaced with Unicode character 0x3f.

The necessary mapping tables can be found at the following location:
<http://www.unicode.org/Public/MAPPINGS/VENDORS/MICSFT/WindowsBestFit/>.

Code pages 932, 936, 949, and 950 are “Double Byte” code pages. The remainder of the “ANSI” code pages supported by windows are “Single Byte” code pages.

For single byte code pages each Unicode code point is replaced by a single byte or 0x3f if an appropriate character doesn’t exist in the code page.

For double byte code pages, each Unicode code point is replaced by either a single byte, or a two byte sequence, depending on the input character, or 0x3f if an appropriate character doesn’t exist in the code page. In our tables the target is a single byte sequence if the most significant byte is 0x00, otherwise it is a double byte sequence, with the lead byte being the most significant byte.

To convert, first check if conversion is being done to a single or double byte code page and load the appropriate WCTABLE code page table.

For each input WCHAR, look up the code point in the WCTABLE. There are 3 possibilities: Not found, single byte, or double byte.

If the input WCHAR is not found, append 0x3f and continue to the next WCHAR.

If the result is a single byte, check to make sure the entry in the MBTABLE matches the input. If it matches, append the single byte to the output. If it does not match, append 0x3f to the output.

If the result is a double byte, check to make sure the entry in the DBCSENTRY table for the appropriate lead byte matches the input WCHAR. If it matches, append the lead byte and trail byte to the output. If it does not match, append 0x3f to the output.

The following pseudocode describes how this conversion should be done:

```
int WideCharToMultiByte(WCHAR* wszInput, byte* szOutput)
{
    // Remember output start so we can return length
    byte* szOutputStart = szOutput;

    // Ask the system for the current ANSI code page, which
    // on windows is a system setting.
    int iCodePage = GetCurrentAnsiCodePage();
    // Load Code Page Tables

    // This will depend on how the code pages are represented on
    // the target machine. TABLECLASS represents some abstract
    // representation of this structure here.
    TABLECLASS pTables = LoadCodePageTables(iCodePage);
    bool bDoubleByte = false;
    if (iCodePage == 932 ||
        iCodePage == 936 ||
        iCodePage == 949 ||
        iCodePage == 950)
        bDoubleByte = true;

    while (*wszInput != 0)
    {
        if (bDoubleByte)
            szOutput = AppendDoubleByte(pTables, *wszInput, szOutput);
        else
            szOutput = AppendSingleByte(pTables, *wszInput, szOutput);

        // Read next input WCHAR
        wszInput++;
    }

    // Null terminate the output
    *szOutput = 0;

    // Return output length
    return szOutput - szOutputStart;
}

byte* AppendSingleByte(TABLECLASS pTables, WCHAR wcIn, byte* szOutput)
{
    // Look up byte that we want to append.
    byte bOut = pTables->LookUpSingleByte(wcIn);

    // Make sure that bOut matches the input, otherwise use ?
    // (ie: no best fit behavior allowed)
    if (wcIn != pTables->LookUpWideChar(bOut))
        bOut = 0x3f;

    *szOutput = bOut;
    szOutput++;
    return szOutput;
}

byte* AppendDoubleByte(TABLECLASS pTables, WCHAR wcIn, byte* szOutput)
{
    // Look up bytes that we want to append.
    UINT16 bytesOut = pTables->LookUpDoubleByte(wcIn);

    // See if it is a single or double byte sequence
    if (bytesOut & 0xFF00)
    {
        // It is a double byte sequence
        // Make sure that bytesOut matches the input, otherwise use ?
        // (ie: no best fit behavior allowed)
        if (wcIn != pTables->LookUpWideChar(bytesOut))
        {
            // Use ?, it will be added below
            bytesOut = 0x003f;
        }
    }
    else
```

```

    {
        // It matched, use the lead byte we found
        // trail byte will be added below
        *szOutput = bytesOut >> 8;
        szOutput++;
    }
}
else
{
    // It is a single byte sequence
    // Make sure that bytesOut matches the input, otherwise use ?
    // (ie: no best fit behavior allowed)
    if (wcIn != pTables->LookUpWideChar(bytesOut & 0xFF))
        bytesOut = 0x003f;
}

// Add the single or trail byte
*szOutput = bytesOut & 0xFF;
szOutput++;

return szOutput;
}

class pTables
{
    // Construction depends on how you choose to store & load the
    // table files

    byte LookUpSingleByte(WCHAR wcIn)
    {
        // How you access the table depends on your storage mechanism.
        // Look up the line in WCTABLE where the first column matches wcIn,
        // and then return the byte value from the second column.
        if (exists WCTABLE{wcIn})
            return WCTABLE{wcIn}.SecondColumn;

        // If it doesn't exist, return ?
        return 0x3f;
    }

    UINT16 LookUpDoubleByte(WCHAR wcIn)
    {
        // How you access the table depends on your storage mechanism.
        // Look up the line in WCTABLE where the first column matches wcIn,
        // and then return the double byte value from the second column.
        if (exists WCTABLE{wcIn})
            return WCTABLE{wcIn}.SecondColumn;

        // If it doesn't exist, return ?
        return 0x003f;
    }

    // Overload that looks up wide chars from single byte code points.
    WCHAR LookUpWideChar(byte bIn)
    {
        // How you access the table depends on your storage mechanism.
        // Look up the line in MBTABLE where the first column matches bIn,
        // and then return the WCHAR value from the second column.
        if (exists MBTABLE{bIn})
            return MBTABLE{bIn}.SecondColumn;

        // If it doesn't exist, return ?
        return 0x003f;
    }

    // Overload that looks up wide chars from double byte code points
    WCHAR LookUpWideChar(UINT16 bytesIn)
    {
        // How you access the table depends on your storage mechanism.
        // First find the DBCSTABLE where the LeadByte matches
        // the lead (most significant) input byte.
    }
}

```

```

if (exists DBCSTABLE{bytesIn >> 8})
{
    DbcsTable = DBCSTABLE{bytesIn >> 8};

    // Look up the line in DbcsTable where the first column
    // matches the input trail (least significant) byte,
    // and then return the WCHAR value from the second column.
    if (exists DbcsTable{bytesIn & 0xFF})
        return DbcsTable{bytesIn & 0xFF}.SecondColumn;
}

// Either the lead byte table or specific trail byte
// doesn't exist in the table, return ?
return 0x003f;
}
}

```

BRTBOOKPROTECTION

Record 534, Size 6

This record specifies options for protecting data in the workbook.

Record data

Offset	Field Name	Size	Contents
0	protpwdBook	2	Specifies the hash of the password required for unlocking the structures and windows in this workbook. See HASH INFORMATION for more details.
2	protpwdRev	2	Specifies the hash of the password required for unlocking the revisions in this workbook. See HASH INFORMATION for more details.
4	grbit1	2	See grbit1 description below.

The grbit1 field contains the following flags and fields:

Offset	Field Name	Bits	Contents
0	fLockStructure	1	=1 if the structure of the workbook is locked. Worksheets in the workbook can't be moved, deleted, hidden, unhidden, or renamed, and new worksheets can't be inserted.
1	fLockWindow	1	=1 if the workbook windows are locked. Windows are the same size and position each time the workbook is opened.
2	fLockRevision	1	=1 if the workbook is locked for revisions.
3	unused	13	Reserved

BRTSHEETPROTECTION

Record 535, Size 66

This record specifies options for protecting data in the sheet.

Record data			
Offset	Field Name	Size	Contents
0	protpwd	2	Specifies the hash of the password required for editing this worksheet. This protection is optional and may be ignored by applications that choose not to support this functionality. See HASH INFORMATION for more details.
2	fLocked	4	=1 if sheet is locked when the sheet is protected.
6	fObjects	4	=1 if objects are locked when the sheet is protected.
10	fScenarios	4	=1 if scenarios are locked when the sheet is protected.
14	fFormatCells	4	=1 if formatting cells is locked when the sheet is protected.
18	fFormatColumns	4	=1 if formatting columns is locked when the sheet is protected.
22	fFormatRows	4	=1 if formatting rows is locked when the sheet is protected.
26	fInsertColumns	4	=1 if inserting columns is locked when the sheet is protected.
30	fInsertRows	4	=1 if inserting rows is locked when the sheet is protected.
34	fInsertHyperlinks	4	=1 if inserting hyperlinks is locked when the sheet is protected.
38	fDeleteColumns	4	=1 if deleting columns is locked when the sheet is protected.
42	fDeleteRows	4	=1 if deleting rows is locked when the sheet is protected.
46	fSelLockedCells	4	=1 if selection of locked cells is locked when the sheet is protected.
50	fSort	4	=1 if sorting is locked when the sheet is protected.
54	fAutoFilter	4	=1 if autofilters are locked when the sheet is protected.
58	fPivotTables	4	=1 if pivot tables are locked when the sheet is protected.
62	fSelUnlockedCells	4	=1 if selection of unlocked cells is locked when the sheet is protected.

BRTRANGEPROTECTION

Record 536, Variable Size

A specified range to be protected. Ranges listed here are protected only when the sheet protection is ON and the cell is flagged as being locked. If no password is specified here, then read/write permissions are automatically given to all users, regardless of additional security descriptor information. In other words, the security descriptor information (specific types of access) at the user level is only applied if a password for this range is specified. When a password is specified, then users not listed specifically as having access should be prompted with a password. If that user supplies the correct password, then they may edit the range or cell in question. This protection is optional and may be ignored by applications who choose not to support this functionality.

Record data			
Offset	Field Name	Size	Contents
0	protpwd	2	Specifies the hash of the password required for editing this range. This protection is optional and may be ignored by applications that choose not to support this functionality. See HASH INFORMATION for more details.
P1	sqref	SQREF	The range of cells that is being protected
P2	strTitle	STR	The title of this range
P3	dwSdRel	4	Relative security descriptor (see SECURITY_DESCRIPTOR in MSDN). This attribute should not be modified. Removing this attribute will remove all permissions granted to users for this range.

BRTFILESHARING

Record 548, Variable Size

This record tracks file sharing settings for the workbook.

Record data			
Offset	Field Name	Size	Contents
0	fReadOnlyRec	2	=1 if on open, the application alerts the user that the file is marked as read-only.
2	wResPass	2	Specifies the hash of the password required for editing this workbook. This protection is optional and may be ignored by applications that choose not to support this functionality. See HASH INFORMATION for more details.
4	strUNWriteRes	STR	Specifies the username of the person with write reservation for this workbook.

BRTCSPROTECTION

Record 669, Size 10

This collection expresses the sheet protection options to enforce when the sheet is protected.

Record data			
Offset	Field Name	Size	Contents
0	protpwd	2	Specifies the hash of the password required for editing this chartsheet. This protection is optional and may be ignored by applications that choose not to support this functionality. See HASH INFORMATION for more details.
2	fLocked	4	=1 if the sheet is locked when the sheet is protected.
6	fObjects	4	=1 if objects are locked when the sheet is protected.

Future Records

Future Record Types (FRTs) are used to roundtrip information that was not supported in that version. Basically, data in an FRT is ignored by versions of Excel that do not recognize the command name or data format. This allows data to be retained by Excel from a file read to a file save, but ultimately the data is ignored and not acted upon by the version of Excel that encounters the data. While Excel 2007 may not support a new command, record, or data format, it does save the unsupported command, record, or data in a defined manner and write these elements back to the record stream when the file is saved. This will allow future versions of Excel that use BIFF12 to load back new records without loss of data.

FRTs that are found in (1) pre-defined containers such as books, sheets, cells, structures, etc. or (2) pre-defined records, will be retained and round tripped by Excel. FRTs found outside of pre-defined containers and records will be ignored.

Records in the FRT system may have an FRTHEADER, depending on the size of the record. Records of 4 bytes or less will not have a header, and the information within can be expected to roundtrip faithfully. Records larger than 4 bytes in length will have an FRT header.

FRT records must always occur either in an FRTBLOCK or an ACBLOCK.

An FRTBLOCK is found between a BRTFRTBEGIN and a BRTFRTEND record. If these records are understood by the application, they are handled as normal; otherwise, they are cached for preservation on save.

An ACBLOCK is found between a BRTACBEGIN and a BRTACEND record. It is a block of FRTs that are supported by specific versions of the application. For instance, if a file uses two AC blocks, one for Excel 2007 and one for post-Excel 2007, then only the Excel 2007 AC Block will be processed and the post-Excel 2007 ACBLOCK will be treated as an FRTBLOCK.

SUPPORTED FRT LOCATIONS

The following records can have an FRTBLOCK written before them within a brtBegin/brtEnd block:

- brtEndFmd [[Record 53](#)]
- brtEndSheet [[Record 130](#)]
- brtEndBook [[Record 132](#)]
- brtEndWsViews [[Record 134](#)]
- brtEndWsView [[Record 138](#)]
- brtEndCsViews [[Record 140](#)]
- brtEndCsView [[Record 142](#)]
- brtEndAfilter [[Record 162](#)]
- brtEndFilterColumn [[Record 164](#)]
- brtEndPivotCacheDef [[Record 180](#)]
- brtEndPCDField [[Record 184](#)]
- brtEndPCDSource [[Record 186](#)]

- brtEndPivotCacheRecords [[Record 194](#)]
- brtEndPCDHierarchy [[Record 198](#)]
- brtEndExtConnection [[Record 202](#)]
- brtEndPCDSDTupleCache [[Record 228](#)]
- brtEndPCDCalcItem [[Record 246](#)]
- brtEndPRRule [[Record 248](#)]
- brtEndPRFilter [[Record 252](#)]
- brtEndStylesheet [[Record 279](#)]
- brtEndSXVD [[Record 286](#)]
- brtEndSXPI [[Record 290](#)]
- brtEndSXDI [[Record 294](#)]
- brtEndSXFORMAT [[Record 304](#)]
- brtEndSXVIEW [[Record 315](#)]
- brtEndSXTH [[Record 319](#)]
- brtEndMetadata [[Record 333](#)]
- brtEndEsfmd [[Record 340](#)]
- brtEndTable [[Record 344](#)]
- brtEndTableCol [[Record 348](#)]
- brtEndTableXmlCPr [[Record 350](#)]
- brtEndUserShView [[Record 424](#)]
- brtEndPCDCalcMem [[Record 434](#)]
- brtEndPCDHGLevel [[Record 438](#)]
- brtEndQsi [[Record 448](#)]
- brtEndQsir [[Record 450](#)]
- brtEndQsif [[Record 458](#)]
- brtEndConditionalFormatting [[Record 462](#)]
- brtEndCFRule [[Record 464](#)]
- brtEndSortState [[Record 531](#)]
- brtEndSXCONDfmt [[Record 559](#)]
- brtEndSXFILTER [[Record 602](#)]
- brtEndCellIgnoreECs [[Record 650](#)]

The following records can have an FRTBLOCK written immediately after them:

- brtRowHdr [[Record 0](#)]
- brtCellBlank [[Record 1](#)]
- brtCellRk [[Record 2](#)]

- brtCellError [[Record 3](#)]
- brtCellBool [[Record 4](#)]
- brtCellReal [[Record 5](#)]
- brtCellSt [[Record 6](#)]
- brtCellIsst [[Record 7](#)]
- brtFmlaString [[Record 8](#)]
- brtFmlaNum [[Record 9](#)]
- brtFmlaBool [[Record 10](#)]
- brtFmlaError [[Record 11](#)]
- brtCell0Blank [[Record 12](#)]
- brtCell0Rk [[Record 13](#)]
- brtCell0Bool [[Record 15](#)]
- brtCell0Real [[Record 16](#)]
- brtCell0St [[Record 17](#)]
- brtCell0Isst [[Record 18](#)]
- brtCellRString [[Record 61](#)]
- brtCell0RString [[Record 62](#)]
- brtxf [[Record 47](#)]
- brtStyle [[Record 48](#)]
- brtBookView [[Record 158](#)]
- brtUserBookView [[Record 397](#)]
- brtUsr [[Record 400](#)]
- brtRRChgCell [[Record 409](#)]
- brtRRHeader [[Record 411](#)]
- brtRRRenSheet [[Record 413](#)]
- brtRRDefName [[Record 415](#)]
- brtRRFormat [[Record 419](#)]
- brtCFVO [[Record 471](#)]
- brtDxf [[Record 507](#)]

FRTHEADER

The FRTHEADER contains runtime information about the FRT.

The first DWORD in the record is used as a bitfield to which contains information on what is contained within the header.

Bit	Contents
0	The record contains REFs

- | | |
|---|---|
| 1 | The record contains SQREFs |
| 2 | The record contains FMLAs |
| 3 | The record contains a relationship ID |
| 4 | The record has a minimum version |
| 5 | Unknown part (same layout as relationship ID) |

Each of the bits in this bit field defines how the FRT header has been extended. If one of these bits is set indicating the record contains that feature, a variable sized header will exist for that feature. The features are written out in the order that they occur in the bit field; REFs are first, then SQREF, then formulas, and so on.

FRT Ref Header

The first DWORD in the ref header contains the number of REFs are located within the header. This should always be a non-zero value. Each reference is then stored as a bit field followed by the actual reference.

The bit fields are equivalent to the special attributes on the XML ref adjust elements.

Bit	Contents
0	=1 if this reference gets deleted
1	=1 if the reference should be adjusted at runtime
2	=1 if the reference gets adjusted
3	=1 if cells that occur in the reference are edited
17	=1 if the reference should be adjusted as an area rather than as a single cell

Other bits are unused in Excel 2007, but may be used in future versions.

After the bit field, the rest of the reference is stored as the first row, its last row, its first column, and its last column.

FRT Sqref Header

The SQREF header is structured very similarly to the REF header. The first DWORD in the SQREF header contains the number of SQREFs which are located in the header. After this, each SQREF is stored as a cref indicating how many references are in the SQREF, then a number of bit fields describing how the SQREF should behave, and finally the references.

Bit	Contents
0	=1 if this reference gets deleted
1	=1 if the reference should be adjusted at runtime

- 2 =1 if the reference gets adjusted
- 3 =1 if cells that occur in the reference are edited

FRT Formula Header

The formula header is constructed similarly to the `REF` and `SQREF` headers. The first field present is a DWORD containing the number of formulas contained in the header.

The individual formulas start with a DWORD bit field which contains what occurs at runtime. The valid bits for the formula are as follows:

Bit	Contents
1	=1 if this reference gets deleted
2	=1 if the reference should be adjusted at runtime

After the bitfield, the individual formula portion contains the `FMLA`, which is described in the [Formula Part](#) section.

FRT Relationship Header

The next header is the relationship-ID header. Unlike the other headers mentioned so far, this header only supports one relationship. The relationship is stored as a simple pascal style string (STR). The first two bytes of the header contain the count of the characters in the string, and are then followed by the string itself.

FRT Version Header

The version header is stored as a single DWORD which contains the minimum version for this feature. Like the Relationship ID, only one minimum version can be stated for the record.

BRTFRTBEGIN

Record 35, Size 0

This record defines the beginning of a collection of FRTs. Does not use the `FRTHEADER`. See [SUPPORTED FRT LOCATIONS](#) for where this record can be found.

BRTFRTEND

Record 36, Size 0

This record defines the end of a collection of FRTs.

BRTACBEGIN

Record 37, Variable Size

This record defines the beginning of a collection of FRTs in an Alternate Context Block (ACBLOCK). Does not use the FRTHEADER. See [SUPPORTED FRT LOCATIONS](#) for where this record can be found.

Record data

Offset	Field Name	Size	Contents
0	cVer	2	Count of versions supported by this AC Block.
2	rgVer	RG 4	An array of versions of the application supported by this ACBLOCK. The count of the versions is not written out before the array, since the count is already accounted for by cVer. If the high bit of a version =1, then if the current application's version is greater than or equal to this value, this workbook is supported by the current application. If the high bit of a version =0, then if the current application's version is equal to this value, this workbook is supported by the current application.

BRTACEND

Record 38, Size 0

This record defines the end of a collection of FRTs in an Alternate Context Block (ACBLOCK).

BRTMUSTUNDERSTAND

Record 621, Variable Size

If this record exists, the application must be able to process this record successfully in order to open the file. Processing this record involves searching the array of supported application version; if one of the supported application versions matches the current application's version, the file may be opened as normal; otherwise, the file load will be cancelled.

Does not use the FRTHEADER. This record can appear in any part.

Record data

Offset	Field Name	Size	Contents
0	rgVer	RG 4	An array of versions of the application supported by this workbook. If the high bit of a version =1, then if the current application's version is less than or equal to this value, this workbook is supported by the current application. If the high bit of a version =0, then if the current application's version is equal to this value, this workbook is supported by the current application.

Microsoft Excel Formulas

This section describes how Excel stores formulas. Formulas most commonly appear in `rgce` fields in `FORMULA`, `ARRAY`, and `NAME` records. In this section, *formula* is a synonym for *parsed expression*, which is the internal tokenized representation of an Excel formula.

PARSED EXPRESSIONS AND TOKENS

Excel uses a modified reverse-Polish notation technique to store parsed expressions. A parsed expression contains a sequence of parse tokens, each of which is either an operand, an operator token, or a control token. Operand tokens push operands onto the stack. Operator tokens perform arithmetic operations on operands. Control tokens assist in formula evaluation by describing properties of the formula.

A token consists of two parts: a token type and a token value. A token type is called a *ptg* (parse thing) in Excel. A *ptg* is 1 byte long and has a value from 01h to 7Fh. The *ptgs* above 7Fh are reserved.

The *ptg* specifies only what kind of information a token contains. The information itself is stored in the token value, which immediately follows the *ptg*. Some tokens consist of only a *ptg*, without an accompanying token value. For example, to specify an addition operation, only the token type *ptgAdd* is required. But to specify an integer operand, specify both the *ptgInt* and the token value, which is an integer.

For example, assume the formula `=5+6` is in cell A1. The parsed expression for this formula consists of three tokens: two integer operand tokens (`<token 1>` and `<token 2>`) and an operator token (`<token 3>`), as shown in the following table.

<code><token 1></code>	<code><token 2></code>	<code><token 3></code>
<code>ptgInt 0005h</code>	<code>ptgInt 0006h</code>	<code>ptgAdd</code>

Note: each *ptgInt* is immediately followed by the integer token value.

If this formula is entered in cell A1 and then examined in the `FORMULA` record (using the BiffView utility), the following is seen in the `rgce` field:

```
1e 05 00 1e 06 00 03
```

These 7 bytes contain the two *ptgInt* (1Eh) tokens — which contain the token values that represent the integers 5 and 6 (0005h and 0006h) — and the *ptgAdd* (03h) token. If the formula were changed to `=5*6`, the third token would be *ptgMul* (05h).

In many cases, the token value consists of a structure of two or more fields. In these cases, offset-0 (zero) is assumed to be the first byte of the token value — that is, the first byte immediately following the token type.

prgbExtra: Extra data following the rgce

For some tokens, such as *ptgArray*, and *ptgMemArea*, extended data beyond the token values needs to be recorded in the file. In this case, the data is recorded immediately following the last token and its values, in the order that the tokens containing extra data were encountered in the parsed expression. Specific information about the structure of this data can be found in the descriptions of the relevant tokens.

Microsoft Excel ptgs

The following table contains all *ptgs* that appear in BIFF files. All other *ptgs* are reserved.

The `ptgSheet` and `ptgEndSheet` tokens are no longer used. The external sheet references are contained in the `ptgNameX`, `ptgRef3d`, and `ptgArea3d` tokens.

Name	Ptg	Type
<code>ptgExp</code>	01h	control
<code>ptgTbl</code>	02h	control
<code>ptgAdd</code>	03h	operator
<code>ptgSub</code>	04h	operator
<code>ptgMul</code>	05h	operator
<code>ptgDiv</code>	06h	operator
<code>ptgPower</code>	07h	operator
<code>ptgConcat</code>	08h	operator
<code>ptgLT</code>	09h	operator
<code>ptgLE</code>	0Ah	operator
<code>ptgEQ</code>	0Bh	operator
<code>ptgGE</code>	0Ch	operator
<code>ptgGT</code>	0Dh	operator
<code>ptgNE</code>	0Eh	operator
<code>ptgIsect</code>	0Fh	operator
<code>ptgUnion</code>	10h	operator
<code>ptgRange</code>	11h	operator
<code>ptgUplus</code>	12h	operator
<code>ptgUminus</code>	13h	operator
<code>ptgPercent</code>	14h	operator
<code>ptgParen</code>	15h	control
<code>ptgMissArg</code>	16h	operand
<code>ptgStr</code>	17h	operand
<code>ptgAttr</code>	19h	control
<code>ptgSheet</code>	1Ah	(ptg DELETED)
<code>ptgEndSheet</code>	1Bh	(ptg DELETED)
<code>ptgErr</code>	1Ch	operand
<code>ptgBool</code>	1Dh	operand
<code>ptgInt</code>	1Eh	operand
<code>ptgNum</code>	1Fh	operand
<code>ptgArray</code>	20h	operand, reference class
<code>ptgFunc</code>	21h	operator
<code>ptgFuncVar</code>	22h	operator

Name	Ptg	Type
ptgName	23h	operand, reference class
ptgRef	24h	operand, reference class
ptgArea	25h	operand, reference class
ptgMemArea	26h	operand, reference class
ptgMemErr	27h	operand, reference class
ptgMemNoMem	28h	control
ptgMemFunc	29h	control
ptgRefErr	2Ah	operand, reference class
ptgAreaErr	2Bh	operand, reference class
ptgRefN	2Ch	operand, reference class
ptgAreaN	2Dh	operand, reference class
ptgMemAreaN	2Eh	control
ptgMemNoMemN	2Fh	control
ptgNameX	39h	operand, reference class
ptgRef3d	3Ah	operand, reference class
ptgArea3d	3Bh	operand, reference class
ptgRefErr3d	3Ch	operand, reference class
ptgAreaErr3d	3Dh	operand, reference class
ptgArrayV	40h	operand, value class
ptgFuncV	41h	operator
ptgFuncVarV	42h	operator
ptgNameV	43h	operand, value class
ptgRefV	44h	operand, value class
ptgAreaV	45h	operand, value class
ptgMemAreaV	46h	operand, value class
ptgMemErrV	47h	operand, value class
ptgMemNoMemV	48h	control
ptgMemFuncV	49h	control
ptgRefErrV	4Ah	operand, value class
ptgAreaErrV	4Bh	operand, value class
ptgRefNV	4Ch	operand, value class
ptgAreaNV	4Dh	operand, value class
ptgMemAreaNV	4Eh	control
ptgMemNoMemNV	4Fh	control
ptgFuncCEV	58h	operator

Name	Ptg	Type
ptgNameXV	59h	operand, value class
ptgRef3dV	5Ah	operand, value class
ptgArea3dV	5Bh	operand, value class
ptgRefErr3dV	5Ch	operand, value class
ptgAreaErr3dV	5Dh	operand, value class
ptgArrayA	60h	operand, array class
ptgFuncA	61h	operator
ptgFuncVarA	62h	operator
ptgNameA	63h	operand, array class
ptgRefA	64h	operand, array class
ptgAreaA	65h	operand, array class
ptgMemAreaA	66h	operand, array class
ptgMemErrA	67h	operand, array class
ptgMemNoMemA	68h	control
ptgMemFuncA	69h	control
ptgRefErrA	6Ah	operand, array class
ptgAreaErrA	6Bh	operand, array class
ptgRefNA	6Ch	operand, array class
ptgAreaNA	6Dh	operand, array class
ptgMemAreaNA	6Eh	control
ptgMemNoMemNA	6Fh	control
ptgFuncCEA	78h	operator
ptgNameXA	79h	operand, array class
ptgRef3dA	7Ah	operand, array class
ptgArea3dA	7Bh	operand, array class
ptgRefErr3dA	7Ch	operand, array class
ptgAreaErr3dA	7Dh	operand, array class

Extended ptgs in BIFF12

In BIFF12, extended ptgs are used to store pivot table names and structured references. These ptgs contain a ptgExtend (ptg=18h), followed by a 1-byte extended ptg type, called an eptg, and then followed by extended data if applicable. Extended ptgs are listed in the following table. All unlisted eptg IDs are reserved for internal or future use.

eptg	eptg Type	Size	Operand Type
19h	eptgList	12	Reference, Array, or Value
1Dh	eptgSxName	4	Value

The data contained in `eptgSxName` is not documented.

eptgList (19h)

This `eptg` specifies the description of a list. This is followed by 12 bytes specifying values about the list. If `fNonResident` is set to 1, this indicates that an `SXSTM` object is recorded in the `prgbExtra`.

Offset	Name	Size	Contents
0	<code>ixti</code>	2	Index to the <code>EXTERNSSHEET</code> record.
2	<code>grbit</code>	2	(See the following table)
4	<code>lstdoid</code>	4	List ID; should = 0xFFFFFFFF if list is nonresident
8	<code>icolFirst</code>	2	Index within the list of the first column in the list reference, if set
10	<code>icolLast</code>	2	Index within the list of the last column in the list reference, if set

The following table displays the contents of the `grbit` field in `eptgList` that exists at offset 2.

Bits	Mask	Name	Contents
0-1	0003h	<code>cicoll</code>	The number of columns that are in the parsed expression. May be 0, 1, or 2.
2-6	00FCh	<code>BitfStRef</code>	<code>BitfStRef</code> field (see below) This field should =0 if <code>fNonResident</code> =1
7	0080H	<code>fOuterSpaces</code>	=1 if spaces should be displayed after the initial [and before the final].
8	0100H	<code>fCommaSpaces</code>	=1 if spaces should be displayed after each comma
9	0200H	(Reserved)	=0
10	0400H	<code>fValue</code>	=1 if this list is a value class.
11	0800H	<code>fArray</code>	=1 if this list is an array class.
12	1000H	<code>fInvalid</code>	=1 if list is invalid, and replaced with #REF
13	2000H	<code>fNonResident</code>	=1 if we refer to a list in a nonresident book If <code>fNonResident</code> is set, <code>lstdoid</code> must be set to 0xFFFFFFFF.
14	4000h	(Reserved)	=0

SXSTM object:

If `fNonResident` is set to 1, this indicates that an `SXSTM` object is written to the file in the `prgbExtra`. The following is the structure of the `SXSTM` object.

Offset	Name	Size	Contents
0	cpsxsu	1	SXSU counts
1	BitfStRef	2	BitfStRef field (see below)
3	stSxview	var	Pivot table name in unicode format

SXSU object:

Following the SXSTM object are a cpsxsu count of SXSU objects. The following table describes the format of an SXSU object.

Offset	Name	Size	Contents
0	(Reserved)	2	=0
2	csxos	1	Count of used SXOS elements

SXOS object:

Following each SXSU objects are a cxsos count of SXOS objects. The following table describes the format of an SXOS object.

Offset	Name	Size	Contents
0	fgrbit	1	This is a two bit field. The first bit is 1 if the sxoper is followed by a : in the reference. The second bit is 1 if a 4 byte reserved field follows fgrbit
1	(Reserved)	4	=-1
5	grbitsxoper	2	The data type of the sequence of list items. One of the following: 1= Numbers 2= Strings 4= Booleans 16= Excel error values 32= Dates 256= Nil (no value)
7	sxoper	var	Data containing the operator. Length and format is determined by grbitsxoper.

BitfStRef fields:

The BitfStRef field describes the attributes of the list. It is found in the eptgList data, and the SXSTM object.

Bit	Mask	Name	Contents
1	0001h	bitFAll	=1 if there is a [#All] item in the list
2	0002h	bitFHeaders	=1 if there is a [#Header] item in the list
3	0004h	bitFData	=1 if there is a [#Data] item in the list
4	0008h	bitFTotals	=1 if there is a [#Totals] item in the list
5	0010h	bitFThisRow	=1 if there is a [#This Row] item in the list

Expression Evaluation

Calculation of Excel formulas is a straightforward process. A last-in, first-out (LIFO) stack, the operand stack, is maintained during calculation. When an operand is encountered, it is pushed onto the stack. When an operator is encountered, it operates on the topmost operand or operands. Operator precedence is irrelevant at evaluation time; operators are handled as soon as they are encountered.

There are three kinds of operators: unary, binary, and function. Unary operators, such as the minus sign that negates a number, operate only on the top operand. Binary operators, such as the addition operator, operate on the top two operands. Function operators, which implement Excel functions, operate on a variable number of operands, depending on how many arguments the function accepts.

All operators work by popping the required operands from the stack, performing calculations, and then pushing the result back onto the operand stack.

Scanning a Parsed Expression

One fairly common operation you can perform on parsed expressions is to scan them, taking appropriate actions at each `ptg`. You can do this with a loop by using a pointer variable that points to the next `ptg` to scan. However, you must increment this pointer carefully, because different `ptgs` may have token values of different lengths.

One approach is to maintain an array with one element per `ptg`. Each element contains the size of the token value. To increment the pointer, add the array element corresponding to the current `ptg` to the pointer. One way of reducing the array size is to limit the array indexes to the range 0–3Fh and then index it using the reference-class `ptg` (the base `ptg`) instead of the value-class or array-class `ptg`. This is possible because the token value is the same for all classes of a particular `ptg`. For more information about operand classes, see “[ptg Values for Operand Tokens](#)”.

There are two tokens, `ptgStr` and `ptgAttr` (when `bitFAttrChoose` is true), that have variable length and are therefore exceptions to the preceding description. The first token, `ptgStr`, is followed by a variable-length string. The token value specifies the length of the string, so the pointer can be incremented by reading the string length (`cch`) and then adding the string length to the pointer.

The other token is `ptgAttr` when `bitFAttrChoose` is true. In this case, the token value contains an optimized `CHOOSE` function, which contains a variable-length sequence of word offsets in the cases (value1, value2, ... arguments) for the `CHOOSE` function. For these, use the `wCases` field to calculate the pointer increment.

Unary Operator Tokens

The unary operator tokens for Excel are described in the following paragraphs. These operators pop the top argument from the operand stack, perform a calculation, and then push the result back onto the operand stack.

ptgUplus: Unary Plus (ptg=12h)

Has no effect on the operand.

ptgUminus: Unary Minus (ptg=13h)

Negates the operand on the top of the stack.

ptgPercent: Percent Sign (ptg=14h)

Divides the top operand by 100.

Binary Operator Tokens

There are several binary operator ptgs. All binary operator ptgs pop the top two arguments from the operand stack, perform the associated calculation, and then push the result back onto the operand stack.

ptgAdd: Addition (ptg=03h)

Adds the top two operands.

ptgSub: Subtraction (ptg=04h)

Subtracts the top operand from the second-to-top operand.

ptgMul: Multiplication (ptg=05h)

Multiplies the top two operands.

ptgDiv: Division (ptg=06h)

Divides the second-to-top operand by the top operand.

ptgPower: Exponentiation (ptg=07h)

Raises the second-to-top operand to the power of the top operand.

ptgConcat: Concatenation (ptg=08h)

Appends the top operand to the second-to-top operand.

ptgLT: Less Than (ptg=09h)

Evaluates to TRUE if the second-to-top operand is less than the top operand; evaluates to FALSE otherwise.

ptgLE: Less Than or Equal (ptg=0Ah)

Evaluates to TRUE if the second-to-top operand is less than or equal to the top operand; evaluates to FALSE otherwise.

ptgEQ: Equal (ptg=0Bh)

Evaluates to TRUE if the top two operands are equal; evaluates to FALSE otherwise.

ptgGE: Greater Than or Equal (ptg=0Ch)

Evaluates to TRUE if the second-to-top operand is greater than or equal to the top operand; evaluates to FALSE otherwise.

ptgGT: Greater Than (ptg=0Dh)

Evaluates to TRUE if the second-to-top operand is greater than the top operand; evaluates to FALSE otherwise.

ptgNE: Not Equal (ptg=0Eh)

Evaluates to TRUE if the top two operands are not equal; evaluates to FALSE otherwise.

ptgIsect: Intersection (ptg=0Fh)

Computes the intersection of the top two operands. This is the Excel space operator.

ptgUnion: Union (ptg=10h)

Computes the union of the top two operands. This is the Excel comma operator.

ptgRange: Range (ptg=11h)

Computes the minimal bounding rectangle of the top two operands. This is the Excel colon operator.

Operand Tokens: Constant

These operand tokens push a single constant operand onto the operand stack.

ptgMissArg: Missing Argument (Operand, ptg=16h)

Indicates a missing argument to an Excel function. For example, the second (missing) argument to the function `DCOUNT(Database,,Criteria)` would be stored as a ptgMissArg.

ptgStr: String Constant (Operand, ptg=17h)

Indicates a string constant ptg followed by a string length field (00 to FFh) and the actual string.

Offset	Name	Size	Contents
0	cch	2	The length of the string
2	rgch	var	The string in Unicode format

ptgStr requires special handling when parsed expressions are scanned. For more information, see "[Scanning a Parsed Expression](#)".

ptgErr: Error Value (Operand, ptg=1Ch)

This ptg is followed by the 1-byte error value (`err`). For a list of error values, see "BOOLERR".

Offset	Name	Size	Contents
0	err	1	An error value

ptgBool: Boolean (Operand, ptg=1Dh)

This ptg is followed by a byte that represents TRUE or FALSE.

Offset	Name	Size	Contents
0	f	1	=1 for TRUE =0 for FALSE

ptgInt: Integer (Operand, ptg=1Eh)

This ptg is followed by a word that contains an unsigned integer.

Offset	Name	Size	Contents
0	w	2	An unsigned integer value

ptgNum: Number (Operand, ptg=1Fh)

This `ptg` is followed by an 8-byte IEEE floating-point number.

Offset	Name	Size	Contents
0	num	8	An IEEE floating-point number

Operand Tokens

Operand tokens push operand values onto the operand stack. These values fall into one of three classes — reference class, value class, or array class — depending on what type of value the formula expects from the operand. The type of value is determined by the context of the operand when the formula is parsed by Excel.

Reference Class

Some operands are required by context to evaluate to references. In this case, the term *reference* is a general term meaning one or more areas on an Excel worksheet.

When the Excel expression evaluator encounters a reference class operand, it pushes only the reference itself onto the operand stack; it does not de-reference it to return the underlying value or values. For example, because we have a `ptgRef`, a reference (to the cell B5) is pushed onto the stack. This function returns the column width of cell B5; therefore, only the reference to B5 is required, and there's no need to de-reference to the value stored in cell B5.

Value Class

This is the most common type of operand. Value class operands push a single de-referenced value onto the operand stack. Using the formula `=A1+1` as an example, because we have a `ptgRefV`, the value (of cell A1, for example: 5) is pushed onto the stack.

Array Class

This operand pushes an array of values onto the operand stack. You can specify the values in an array constant or in a reference to cells. Using the formula `=SUM({1,2,3;4,5,6})` as an example, because we have a `ptgArrayA`, the whole array (`{1,2,3;4,5,6}`) is pushed onto the stack.

ptg Values for Operand Tokens

The three classes of operand tokens are divided numerically, as shown in the following table.

Operand class	Ptg values
Reference	20h–3Fh
Value	40h–5Fh
Array	60h–7Fh

The arithmetic difference between `ptg` classes is 20h. This is the basis for forming the class variants of `ptgs`. Class variants of `ptgs` are formed from the reference class `ptg`, also known as the base `ptg`. To form the value class `ptg` from the base `ptg`, add 20h to the `ptg` and append `v` (for “value”) to the `ptg` name. To form the array class `ptg` from the base `ptg`, add 40h to the `ptg` and append `A` (for “array”) to the `ptg` name. These rules are summarized in the following table for a sample base `ptg`, `ptgRef`.

Class	Name	Ptg
Reference	ptgRef	24h
Value	ptgRefV	44h
Array	ptgRefA	64h

The following example is a suggested method for calculating the base ptg from any class variant.

```

if (ptg & 40h)
{
    /* Value class ptg. Set the 20h bit to
       make it Reference class, then strip
       off the high-order bits. */
    ptgBase = (ptg | 20h) & 3Fh;
}
else
{
    /* Reference or Array class ptg. The 20h bit
       is already set, so just have to strip off
       the high-order bits. */
    ptgBase = ptg & 3Fh;
}

```

A more efficient implementation would define a macro that computes the base ptg, as in the following example.

```
#define PtgBase(ptg) (((ptg & 0x40) ? (ptg | 0x20): ptg) & 0x3F)
```

Operand Tokens: Base

This section describes the operand tokens in their base form (also known as reference class operand tokens).

ptgArray: Array Constant (Operand, ptg=20h)

Array constant followed by 10 reserved bytes.

The token value for ptgArray consists of the array dimensions and the array values. ptgArray differs from most other operand tokens in that the not all of the token data immediately follows the token type. Instead, the token value is written to the prgbExtra field. The format of the token value does appear immediately after the token type, and is shown in the following table.

Offset	Name	Size	Contents
0	ccol	2	The number of columns in the array constant
2	crw	4	The number of rows in the array constant
6	(Reserved)	4	

The number of values in the array constant is equal to the product of the array dimensions, crw*ccol. Each value is either an 8-byte IEEE floating-point number, a 1-byte Boolean value, an error value, or a string. Below are the formats for each of the different types of array entries.

IEEE Floating-Point Number			
Offset	Name	Size	Contents
0	grbit	1	=00h
1	num	8	IEEE floating-point number

String			
Offset	Name	Size	Contents
0	grbit	1	=01h
1	cch	2	The length of the string
3	rgch	var	The string

Boolean Value			
Offset	Name	Size	Contents
0	grbit	1	=02h
1	f	1	Boolean value

Error Value			
Offset	Name	Size	Contents
0	grbit	1	=04h
1	error	4	Error value

If a formula contains more than one array constant, the token values for the array constants are appended to the saved parsed expression in order: first the values for the first array constant, then the values for the second array constant, and so on.

The reference class `ptgArray` never appears in an Excel formula; only the `ptgArrayV` and `ptgArrayA` classes are used.

ptgName: Name (Operand, ptg=23h)

This `ptg` stores the index to a name. The `ilbl` field is a 1-based index to the table of `NAME` records in the workbook.

Offset	Name	Size	Contents
0	ilbl	2	Index to the <code>NAME</code> table
2	(Reserved)	2	Reserved; must be 0 (zero)

ptgRef: Cell Reference (Operand, ptg=24h)

This `ptg` specifies a reference to a single cell. It is followed by references for the row and column that contain the cell. The column number is encoded.

Offset	Name	Size	Contents
0	rw	4	The column of the reference
4	grbitCol	2	(See the following table)

Only the low-order 14 bits of the `grbitCol` field store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the `grbitCol` field.

Bits	Mask	Name	Contents
0-13	3FFFh	col	The column number or column offset (0-based)
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

For example, cell C5 is row number 4, column number 2 (Excel stores 0-based cell references). Therefore, the absolute reference \$C\$5 is stored in a `ptgRef`, as shown in the following file fragment.

```
24 04 00 00 00 02 00
```

In this case, `rw=0004h` and `grbitCol=0002h`. **Note:** bits 14 and 15 of `grbitCol` are both 0 (zero).

The relative reference C5 is stored in a `ptgRef`, as shown in the following file fragment.

```
24 04 00 00 00 02 C0
```

In this case, where `grbitCol=C004h` and `col=02h`, bits 14 and 15 of `grbitCol` are both 1.

Mixed references are stored in the same way, with appropriate coding in `grbitCol`.

ptgArea: Area Reference (Operand, ptg=25h)

This `ptg` specifies a reference to a rectangle (range) of cells. `ptgArea` is followed by 12 bytes that define the first row, last row, first column, and last column of the rectangle. The numbers of the first and last columns are encoded.

Offset	Name	Size	Contents
0	<code>rwFirst</code>	4	The first row of the reference
4	<code>rwLast</code>	4	The last row of the reference
8	<code>grbitColFirst</code>	2	(See the following table)
10	<code>grbitColLast</code>	2	(See the following table)

Only the low-order 14 bits of the `grbitColFirst` and `grbitColLast` fields store the column offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the `grbitColFirst` and `grbitColLast` fields.

Bits	Mask	Name	Contents
0-13	3FFFh	col	The column number or column offset (0-based)
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

ptgMemArea: Constant Reference Subexpression (Operand, ptg=26h)

This `ptg` is used to optimize reference expressions. A reference expression consists of operands — usually references to cells or areas — joined by reference operators (intersection, union, and range). Three examples of reference expressions are given in the following table.

Reference expression	Evaluates to
(A1,C3,D3:D5)	Two single cells and a 3x1 area
(A1:C3) (B2:D4)	A 2x2 area (the space character is the intersection operator)
(Name C3)	The smallest area that contains both C3 and all the cells referenced in Name (the space character is the intersection operator)

Many reference expressions evaluate to constant references. In the preceding examples, the first two expressions always evaluate to the same reference. The third example doesn't evaluate to a constant reference because the name's definition may change, which might cause the reference expression to evaluate differently.

When a reference expression evaluates to a constant reference, Excel stores the constant reference in the parsed formula through a `ptgMemArea` token. This saves time during expression evaluation, because the constant part of the expression is pre-evaluated. This part of the expression is known as a reference subexpression.

The token value for `ptgMemArea` consists of two parts: the length of the reference subexpression, and the value of the reference subexpression. The length is stored immediately following the `ptgMemArea`, whereas the value is written in the `prgbExtra` data.

The format of the length is shown in the following table.

Offset	Name	Size	Contents
0	(Reserved)	4	
4	cce	2	The length of the reference subexpression

Immediately following this part of the token value is the reference subexpression itself.

The rest of the token value (that is, the value of the reference subexpression) is located in the `prgbExtra` data. The format for this data is shown in the following table.

Offset	Name	Size	Contents
0	cref	2	The number of rectangles to follow
2	rgref	var	An array of rectangles

Each `rgref` rectangle is 16 bytes long and contains the fields listed in the following table.

Offset	Name	Size	Contents
0	rwFirst	4	The first row
4	rwLast	4	The last row
8	colFirst	4	The first column
12	colLast	4	The last column

If a formula contains more than one `ptgMemArea`, the token values are appended to the saved parsed expression in order: first the values for the first `ptgMemArea`, then the values for the second `ptgMemArea`, and so on.

`ptgMemErr`: Erroneous Constant Reference Subexpression (Operand, `ptg=27h`)

This `ptg` is closely related to `ptgMemArea`. It is used for pre-evaluating reference subexpressions that do not evaluate to references.

For example, consider the formula `=SUM(C:C 3:3)`, which is the sum of the intersection of column C and row 3 (the space between C:C and 3:3 is the intersection operator). The argument to the `SUM` function is a valid reference subexpression that generates a `ptgMemArea` for pre-evaluation. However, if you delete column C, the formula adjusts to `=SUM(#REF! 3:3)`. In this case, the argument to `SUM` is still a constant reference subexpression, but it doesn't evaluate to a reference. Therefore, a `ptgMemErr` is used for pre-evaluation.

The token value consists of the error value and the length of the reference subexpression. Its format is shown in the following table.

Offset	Name	Size	Contents
0	(Reserved)	4	
4	cce	2	The length of the reference subexpression

The reference subexpression will contain a `ptgRefErr` or `ptgAreaErr`.

`ptgRefErr`: Deleted Cell Reference (Operand, `ptg=2Ah`)

This `ptg` specifies a cell reference adjusted to `#REF!` as a result of worksheet editing (such as cutting, pasting, and deleting). The `ptgRefErr` is followed by 6 unused bytes.

Offset	Name	Size	Contents
0	(Reserved)	6	

The original base type of the adjusted `ptg` is `ptgRef` or `ptgRefN`.

`ptgAreaErr`: Deleted Area Reference (Operand, `ptg=2Bh`)

This `ptg` specifies an area reference adjusted to `#REF!` as a result of worksheet editing (such as cutting, pasting, and deleting). The `ptgAreaErr` is followed by 12 unused bytes.

Offset	Name	Size	Contents
0	(Reserved)	12	

The original base type of the adjusted `ptg` is `ptgArea` or `ptgAreaN`.

`ptgRefN`: Cell Reference Within a Shared Formula (Operand, `ptg=2Ch`)

Similar to its `ptgRef` counterpart, the `ptgRefN` specifies a reference to a single cell. It is followed by references for the row and column that contain the cell; the row number of the cell is encoded as bit fields.

Offset	Name	Size	Contents
0	rw	4	The row (or row offset) of the reference
4	grbitCol	2	(See the following table)

Only the low-order 14 bits of the `grbitCol` field store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the `grbitCol` field.

Bits	Mask	Name	Contents
0-13	3FFFh	col	The column number or column offset (0-based)
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

The only difference between `ptgRefN` and `ptgRef` is in the way relative references are stored. Relative references in shared formulas are stored as offsets, not as row and column numbers (as in `ptgRef`). For more information, see "SHRFMLA".

ptgAreaN: Area Reference Within a Shared Formula (Operand, ptg=2Dh)

The `ptgAreaN` token specifies a reference to a rectangle of cells. Both the first column and last column are encoded.

Offset	Name	Size	Contents
0	rwFirst	4	The first row of the absolute reference or relative reference
4	rwLast	4	The last row of the absolute reference or relative reference
8	grbitColFirst	2	(See the following table)
10	grbitColLast	2	(See the following table)

Only the low-order 14 bits of the `grbitColFirst` and `grbitColLast` fields store the column offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the `grbitColFirst` and `grbitColLast` fields.

Bits	Mask	Name	Contents
0-13	3FFFh	col	The column number or column offset (0-based)
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

The only difference between `ptgAreaN` and `ptgArea` is in the way relative references are stored.

ptgNameX: Name or External Name (Operand, ptg=39h)

This `ptg` stores the index to a name.

Offset	Name	Size	Contents
0	ixti	2	Index into the EXTERNSHEET record.
2	ilbl	2	The index to the NAME or EXTERNNAME table (1-based)

4 (Reserved) 2 Reserved; must be 0 (zero)

ptgRef3d: 3-D Cell Reference (Operand, ptg=3Ah)

This ptg stores a 3-D cell reference (for example, Sheet1:Sheet3!\$A\$1).

Offset	Name	Size	Contents
0	ixti	2	Index into the EXTERNSHEET record.
2	rw	4	The row of the reference, or the row offset.
6	grbitCol	2	(See the following table.)

Only the low-order 14 bits of the grbitCol field store the column number of the reference. The 2 MSBs specify whether the row and column references are relative or absolute. The following table shows the bit structure of the grbitCol field.

Bits	Mask	Name	Contents
0-13	3FFFh	col	The column number or column offset (0-based)
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

ptgArea3d: 3-D Area Reference (Operand, ptg=3Bh)

This ptg stores a 3-D area reference (for example, Sheet1:Sheet3!A1:E9).

Offset	Name	Size	Contents
0	ixti	2	Index into the EXTERNSHEET record.
2	rwFirst	4	The first row in the area.
6	rwLast	4	The last row in the area.
10	grbitColFirst	2	The first column of the reference, or the column offset; see following table.
12	grbitColLast	2	The last column of the reference, or the column offset; see following table.

Only the low-order 14 bits of the grbitColFirst and grbitColLast fields store the column offsets of the reference. The 2 MSBs of each field specify whether the row and column offset are relative or absolute. The following table shows the bit structure of the grbitColFirst and grbitColLast fields.

Bits	Mask	Name	Contents
0-13	3FFFh	col	The column number or column offset (0-based)
14	4000h	fColRel	=1 if the column offset is relative =0 otherwise
15	8000h	fRwRel	=1 if the row offset is relative =0 otherwise

ptgRefErr3d: Deleted 3-D Cell Reference (Operand, ptg=3Ch)

This `ptg` stores a 3-D cell reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The `ptgRefErr3d` is identical to `ptgRef3d`.

ptgAreaErr3d: Deleted 3-D Area Reference (Operand, ptg=3Dh)

This `ptg` stores a 3-D area reference adjusted to **#REF!** as a result of worksheet editing (such as cutting, pasting, and deleting). The `ptgAreaErr3d` is identical to `ptgArea3d`.

Control Tokens

ptgExp: Array Formula or Shared Formula (ptg=01h)

This `ptg` indicates an array formula or a shared formula. When `ptgExp` occurs in a formula, it is the only token in the formula. This indicates the cell containing the formula is part of an array or part of a shared formula. The actual formula is found in an `ARRAY` record.

The token value for `ptgExp` consists of the row and column of the upper-left corner of the array formula.

Offset	Name	Size	Contents
0	<code>rwFirst</code>	4	The row number of the upper-left corner
4	<code>colFirst</code>	2	The column number of the upper-left corner

ptgTbl: Data Table (ptg=02h)

This `ptg` indicates a data table. When `ptgTbl` occurs in a formula, it is the only token in the formula. This indicates the cell containing the formula is an interior cell in a data table; the table description is found in a `TABLE` record. Rows and columns that contain input values to be substituted in the table do not contain `ptgTbl`.

The token value for `ptgTbl` consists of the row and column of the upper-left corner of the table's interior.

Offset	Name	Size	Contents
0	<code>rwFirst</code>	4	The row number of the upper-left corner
4	<code>colFirst</code>	2	The column number of the upper-left corner

ptgParen: Parenthesis (ptg=15h)

This `ptg` is used only when Excel unparses a parsed expression (for example, to display it in the formula bar). This `ptg` is not used to evaluate parsed expressions. It indicates that the previous token in the parsed expression should be in parentheses. If the previous token is an operand, only that operand is in parentheses. If the previous token is an operator, the operator and all of its operands are in parentheses.

For example, the formula `=1+(2)` is stored as follows:

```

ptgInt      0001h
ptgInt      0002h
ptgParen
ptgAdd

```

In this case, only the integer operand 2 is in parentheses.

The formula `=(1+2)` is stored as follows:

ptgInt	0001h
ptgInt	0002h
ptgAdd	
ptgParen	

In this example, the parenthesized quantity consists of the `ptgAdd` operator and both of its operands.

ptgAttr: Special Attribute (ptg=19h)

This `ptg` is used for several different purposes. In all cases, the token value consists of a group of flag bits and a data word.

The `grbit` field contains the following option flags:

Bits	Mask	Name	Contents
0	01h	bitFAttrSemi	=1 if the formula contains a volatile function
1	02h	bitFAttrIf	=1 to implement an optimized IF function
2	04h	bitFAttrChoose	=1 to implement an optimized CHOOSE function
3	08h	bitFAttrGoto	=1 to jump to another location within the parsed expression
4	10h	bitFAttrSum	=1 to implement an optimized SUM function
5	20h	bitFAttrBaxcel	=1 if the formula is a BASIC-style assignment statement
6	40h	biffFAttrSpace	=1 if the macro formula contains spaces after the equal sign
7	80h	biffFIffError	=1 to implement an optimized IFERROR function

`ptgAttr` requires special handling when parsed expressions are scanned. For more information, see "[Scanning a Parsed Expression](#)".

bitFAttrSemi

Set to 1 if the formula contains a volatile function—that is, a function that is calculated in every recalculation. If `ptgAttr` is used to indicate a volatile function, it must be the first token in the parsed expression. If `grbit=bitFAttrSemi`, then the `b` (or `w`) field is don't-care.

bitFAttrIf

Indicates an optimized IF function. An IF function contains three parts: a condition, a TRUE subexpression, and a FALSE subexpression. The syntax of an associated Excel formula would be `IF(condition, TRUE subexpression, FALSE subexpression)`.

`bitFAttrIf` immediately follows the condition portion of the parsed expression. The `b` (or `w`) field specifies the offset to the FALSE subexpression; the TRUE subexpression is found immediately following the `ptgAttr` token. At the end of the TRUE subexpression, there is a `bitFAttrGoto` token that causes a jump to beyond the FALSE subexpression. In this way, Excel evaluates only the correct subexpression instead of evaluating both of them and discarding the wrong one.

The FALSE subexpression is optional in Excel. If it is missing, the `b` (or `w`) field specifies an offset to beyond the TRUE subexpression.

bitFAttrChoose

Indicates an optimized CHOOSE function. The `cCases` (or `wCases`) field specifies the number of cases in the CHOOSE function. It is followed by an array of word offsets to those cases. The format of this complex token value is shown in the following table.

Offset	Name	Size	Contents
0	<code>grbit</code>	1	bitFAttrChoose (04h).
1	<code>wCases</code>	2	The number of cases in the CHOOSE function.
3	<code>rgw</code>	var	A sequence of word offsets to the CHOOSE cases. The number of words in this field is equal to <code>wCases+1</code> .

bifFAttrGoto

Instructs the expression evaluator to skip part of the parsed expression during evaluation. The `b` (or `w`) field specifies the number of bytes (or words) to skip, minus 1.

bifFAttrSum

Indicates an optimized SUM function (a SUM that has a single argument). For example, the sum of the cells in a 3-D reference—which has the formula `=SUM(Sheet1:Sheet3!C11)`—generates a `ptgAttr` with `bitFAttrSum` TRUE. The `b` (or `w`) field is don't-care.

bifFAttrSpace

Indicates a formula (macro sheet or worksheet) contains spaces or carriage returns. Excel retains spaces and returns in macro sheet and worksheet formulas (in version 3.0 and earlier, spaces and returns would have been eliminated when the formula was parsed). The `bAttrSpace` field contains an attribute code, and the `bSpace` field contains the number of spaces or returns. The attribute codes are listed in the following table.

Attribute	Value
<code>bitFSpace</code>	00h
<code>bitFEnter</code>	01h
<code>bitFPreSpace</code>	02h
<code>bitFPreEnter</code>	03h
<code>bitFPostSpace</code>	04h
<code>bitFPostEnter</code>	05h
<code>bitFPreFmlaSpace</code>	06h

The `bitFSpace` and `bitFEnter` attributes indicate that `bSpace` contains the number of spaces or returns before the next `ptg` in the formula.

The `bitFPreSpace`, `bitFPreEnter`, `bitFPostSpace`, and `bitFPostEnter` attributes occur with a `ptgParen`. Because one `ptgParen` represents two matched parentheses, the `ptgAttr` must encode the position of the space or return if it occurs before either parenthesis. For example, the `ptgs` that express the worksheet formula `= ("spaces")`, which contains four spaces before the opening and closing parentheses, would appear in a formula record as shown in the following table.

Hex dump	Ptg type	Decodes to
17 06 73 70 61 63 65 73	<code>ptgStr</code>	The string "spaces" (operand)

Hex dump	Ptg type	Decodes to
19 40 02 04	ptgAttr	Four spaces before the opening parenthesis
19 40 04 04	ptgAttr	Four spaces before the closing parenthesis
15	ptgParen	The enclose operand (ptgStr) in parentheses

bitFAttrIfError

Indicates an `IFERROR` function. If this flag is set, the following word in the file is the offset to skip in the event that no error occurs.

`bitFAttrIfError` immediately follows the expression argument to be evaluated. If an error occurs, the default value is then evaluated instead. Otherwise, this default value is skipped over. The word immediately following the `bitFAttrIfError` token should be a data word containing the offset to skip in the event that no error occurs. This offset should be equal to the length of the default value expression.

ptgMemNoMem: Incomplete Constant Reference Subexpression (ptg=28h)

This `ptg` is closely related to `ptgMemArea`. It is used to indicate a constant reference subexpression that could not be pre-evaluated because of insufficient memory.

The token value consists of the length of the reference subexpression, as shown in the following table.

Offset	Name	Size	Contents
0	(Reserved)	4	
4	cce	2	The length of the reference subexpression

ptgMemFunc: Variable Reference Subexpression (ptg=29h)

This `ptg` indicates a reference subexpression that does not evaluate to a constant reference. Any reference subexpression that contains one or more of the following items generates a `ptgMemFunc`.

Subexpression contains	Example
A function	<code>OFFSET(ACTIVE.CELL(),1,1):\$C\$2</code>
A name	<code>INDEX(first_cell:\$D\$2,1,1)</code>
An external reference	<code>SALES.XLS!\$A\$1:SALES.XLS!\$C\$3</code>

The token value consists of the length of the reference subexpression.

Offset	Name	Size	Contents
0	cce	2	The length of the reference subexpression

ptgMemAreaN: Reference Subexpression Within a Name (ptg=2Eh)

This `ptg` contains a constant reference subexpression within a name definition. Unlike `ptgMemArea`, `ptgMemAreaN` is not used to pre-evaluate the reference subexpression.

The token value consists of the length of the reference subexpression.

Offset	Name	Size	Contents
0	cce	2	The length of the reference subexpression

ptgMemNoMemN: Incomplete Reference Subexpression Within a Name (ptg=2Fh)

This `ptg` is closely related to `ptgMemAreaN`. It is used to indicate a constant reference subexpression within a name that could not be evaluated because of insufficient memory.

The token value consists of the length of the reference subexpression, as shown in the following table.

Offset	Name	Size	Contents
0	cce	2	The length of the reference subexpression

Function Operators

The following paragraphs describe the function operator `ptgs`. All of these operators pop arguments from the operand stack, compute a function, and then push the result back onto the operand stack. The number of operands popped from the stack is equal to the number of arguments passed to the Excel function. Some Excel functions always require a fixed number of arguments, whereas others accept a variable number of arguments. The `SUM` function, for example, accepts a variable number of arguments.

Although they're operators, function tokens also behave like operands in that they can occur in any of the three `ptg` classes: reference, value, or array.

ptgFunc: Function, Fixed Number of Arguments (Operator, ptg=21h)

This `ptg` indicates an Excel function with a fixed number of arguments. The `ptgFunc` is followed by the index to the function table.

Offset	Name	Size	Contents
0	iftab	2	The index to the function table;

ptgFuncVar: Function, Variable Number of Arguments (Operator, ptg=22h)

This `ptg` indicates an Excel function with a variable number of arguments. The `ptgFuncVar` is followed by the number of arguments (1 byte) and then the index to the function table (2 bytes).

Offset	Bits	Mask	Name	Contents
0	6-0	7Fh	cargs	The number of arguments to the function.
	7	80h	fPrompt	=1, function prompts the user (macro functions that end with a question mark).
1	14-0	7FFFh	iftab	The index to the function table;
	15	8000h	fCE	The function is a command-equivalent.

End Notes

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Available paper sizes are as follows:

- 1 = Letter paper (8.5 in. by 11 in.)
- 2 = Letter small paper (8.5 in. by 11 in.)
- 3 = Tabloid paper (11 in. by 17 in.)
- 4 = Ledger paper (17 in. by 11 in.)
- 5 = Legal paper (8.5 in. by 14 in.)
- 6 = Statement paper (5.5 in. by 8.5 in.)
- 7 = Executive paper (7.25 in. by 10.5 in.)
- 8 = A3 paper (297 mm by 420 mm)
- 9 = A4 paper (210 mm by 297 mm)
- 10 = A4 small paper (210 mm by 297 mm)
- 11 = A5 paper (148 mm by 210 mm)
- 12 = B4 paper (250 mm by 353 mm)
- 13 = B5 paper (176 mm by 250 mm)
- 14 = Folio paper (8.5 in. by 13 in.)
- 15 = Quarto paper (215 mm by 275 mm)
- 16 = Standard paper (10 in. by 14 in.)
- 17 = Standard paper (11 in. by 17 in.)
- 18 = Note paper (8.5 in. by 11 in.)
- 19 = #9 envelope (3.875 in. by 8.875 in.)
- 20 = #10 envelope (4.125 in. by 9.5 in.)
- 21 = #11 envelope (4.5 in. by 10.375 in.)
- 22 = #12 envelope (4.75 in. by 11 in.)
- 23 = #14 envelope (5 in. by 11.5 in.)
- 24 = C paper (17 in. by 22 in.)
- 25 = D paper (22 in. by 34 in.)
- 26 = E paper (34 in. by 44 in.)
- 27 = DL envelope (110 mm by 220 mm)
- 28 = C5 envelope (162 mm by 229 mm)
- 29 = C3 envelope (324 mm by 458 mm)
- 30 = C4 envelope (229 mm by 324 mm)
- 31 = C6 envelope (114 mm by 162 mm)
- 32 = C65 envelope (114 mm by 229 mm)
- 33 = B4 envelope (250 mm by 353 mm)
- 34 = B5 envelope (176 mm by 250 mm)
- 35 = B6 envelope (176 mm by 125 mm)
- 36 = Italy envelope (110 mm by 230 mm)
- 37 = Monarch envelope (3.875 in. by 7.5 in.).
- 38 = 6 3/4 envelope (3.625 in. by 6.5 in.)
- 39 = US standard fanfold (14.875 in. by 11 in.)
- 40 = German standard fanfold (8.5 in. by 12 in.)
- 41 = German legal fanfold (8.5 in. by 13 in.)
- 42 = ISO B4 (250 mm by 353 mm)
- 43 = Japanese double postcard (200 mm by 148 mm)
- 44 = Standard paper (9 in. by 11 in.)
- 45 = Standard paper (10 in. by 11 in.)
- 46 = Standard paper (15 in. by 11 in.)
- 47 = Invite envelope (220 mm by 220 mm)
- 50 = Letter extra paper (9.275 in. by 12 in.)
- 51 = Legal extra paper (9.275 in. by 15 in.)
- 52 = Tabloid extra paper (11.69 in. by 18 in.)
- 53 = A4 extra paper (236 mm by 322 mm)
- 54 = Letter transverse paper (8.275 in. by 11 in.)
- 55 = A4 transverse paper (210 mm by 297 mm)
- 56 = Letter extra transverse paper (9.275 in. by 12 in.)
- 57 = SuperA/SuperA/A4 paper (227 mm by 356 mm)
- 58 = SuperB/SuperB/A3 paper (305 mm by 487 mm)
- 59 = Letter plus paper (8.5 in. by 12.69 in.)
- 60 = A4 plus paper (210 mm by 330 mm)
- 61 = A5 transverse paper (148 mm by 210 mm)
- 62 = JIS B5 transverse paper (182 mm by 257 mm)
- 63 = A3 extra paper (322 mm by 445 mm)
- 64 = A5 extra paper (174 mm by 235 mm)

65 = ISO B5 extra paper (201 mm by 276 mm)
 66 = A2 paper (420 mm by 594 mm)
 67 = A3 transverse paper (297 mm by 420 mm)
 68 = A3 extra transverse paper (322 mm by 445 mm)

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Reserved built-in names begin with "_xlnm.". End users shall not use this string for custom names in the user interface. *Print:* _xlnm .Print_Area specifies the workbook's print area. _xlnm .Print_Titles specifies the row(s) or column(s) to repeat at the top of each printed page. *Filter & Advanced Filter:* _xlnm .Criteria refers to a range containing the criteria values to be used in applying an advanced filter to a range of data. _xlnm ._FilterDatabase refers to a range to which an advanced filter has been applied OR represents the source data range, unfiltered OR refers to a range to which an AutoFilter has been applied. _xlnm .Extract: this defined name refers to the range containing the filtered output values resulting from applying an advanced filter criteria to a source range. *Miscellaneous:* _xlnm .Consolidate_Area refers to a consolidation area. _xlnm .Database refers to the range specified in a database data source. _xlnm .Sheet_Title refers to a sheet title.

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Number format codes are as follows:

All Languages

ID	Format Code
0	General
1	0
2	0.00
3	#,##0
4	#,##0.00
9	0%
10	0.00%
11	0.00E+00
12	# ?/?
13	# ??/??
14	mm-dd-yy
15	d-mmm-yy
16	d-mmm
17	mmm-yy
18	h:mm AM/PM
19	h:mm:ss AM/PM
20	h:mm
21	h:mm:ss
22	m/d/yy h:mm

37	#,##0 ;(#,##0)
38	#,##0 ;[Red](#,##0)
39	#,##0.00;(#,##0.00)
40	#,##0.00;[Red](#,##0.00)
45	mm:ss
46	[h]:mm:ss
47	mmss.0
48	##0.0E+0
49	@

"General" Format

Some additional comments about the "General" number format are appropriate.

The primary goal when a cell is using "General" formatting is to render the cell content without user-specified guidance to the best ability of the application.

Alignment

(Specified for Left-to-Right mode)

- Strings: left aligned
- Boolean/error values: centered
- Numbers: right aligned
- Dates: do not follow the "General" format, instead automatically convert to date formatting.

Numbers

The application shall attempt to display the full number up to 11 digits (inc. decimal point). If the number is too large, the application shall attempt to show exponential format. If the number has too many significant digits, the display shall be truncated. The optimal method of display is based on the available cell width. If the number cannot be displayed using any of these formats in the available width, the application shall show "#" across the width of the cell.

Conditions for switching to exponential format:

1. The cell value must have at least five digits for xE-xx
2. If the exponent is bigger than the size allowed, a floating point number cannot fit, so try exponential notation.
3. Similarly, for negative exponents, check if there is space for even one (non-zero) digit in floating point format.
4. Finally, if there isn't room for all of the significant digits in floating point format (for a negative exponent), exponential format shall display more digits if the exponent is less than -3. (The 3 is because E-xx takes 4 characters, and the leading 0 in floating point takes only 1 character. Thus, for an exponent less than -3, there is more than 3 additional leading 0's, more than enough to compensate for the size of the E-xx.)

Floating point rule:

For general formatting in cells, max overall length for cell display is 11, not including negative sign, but includes leading zeros and decimal separator.

CHT and CHS		
ID	CHT Format Code	CHS Format Code
27	[\$-404]e/m/d	yyyy"年"m"月"
28	[\$-404]e"年"m"月"d"日"	m"月"d"日"
29	[\$-404]e"年"m"月"d"日"	m"月"d"日"

30	m/d/yy	m-d-yy
31	yyyy"年"m"月"d"日"	yyyy"年"m"月"d"日"
32	hh"時"mm"分"	h"时"mm"分"
33	hh"時"mm"分"ss"秒"	h"时"mm"分"ss"秒"
34	上午/下午hh"時"mm"分"	上午/下午h"时"mm"分"
35	上午/下午hh"時"mm"分"ss"秒"	上午/下午h"时"mm"分"ss"秒"
36	[\$-404]e/m/d	yyyy"年"m"月"
50	[\$-404]e/m/d	yyyy"年"m"月"
51	[\$-404]e"年"m"月"d"日"	m"月"d"日"
52	上午/下午hh"時"mm"分"	yyyy"年"m"月"
53	上午/下午hh"時"mm"分"ss"秒"	m"月"d"日"
54	[\$-404]e"年"m"月"d"日"	m"月"d"日"
55	上午/下午hh"時"mm"分"	上午/下午h"时"mm"分"
56	上午/下午hh"時"mm"分"ss"秒"	上午/下午h"时"mm"分"ss"秒"
57	[\$-404]e/m/d	yyyy"年"m"月"
58	[\$-404]e"年"m"月"d"日"	m"月"d"日"

CHT and CHS (with unicode values provided for language glyphs where they occur)

ID	CHT Format Code	CHS Format Code
27	[\$-404]e/m/d	yyyy"5E74"m"6708"
28	[\$-404]e"5E74"m"6708"d"65E5"	m"6708"d"65E5"
29	[\$-404]e"5E74"m"6708"d"65E5"	m"6708"d"65E5"
30	m/d/yy	m-d-yy
31	yyyy"5E74"m"6708"d"65E5"	yyyy"5E74"m"6708"d"65E5"
32	hh"6642"mm"5206"	h"65F6"mm"5206"
33	hh"6642"mm"5206"ss"79D2"	h"65F6"mm"5206"ss"79D2"
34	4E0A5348/4E0B5348hh"6642"mm"5206"	4E0A5348/4E0B5348h"65F6"mm"5206"
35	4E0A5348/4E0B5348hh"6642"mm"5206"ss"79D2"	4E0A5348/4E0B5348h"65F6"mm"5206"ss"79D2"
36	[\$-404]e/m/d	yyyy"5E74"m"6708"
50	[\$-404]e/m/d	yyyy"5E74"m"6708"
51	[\$-404]e"5E74"m"6708"d"65E5"	m"6708"d"65E5"
52	4E0A5348/4E0B5348hh"6642"mm"5206"	yyyy"5E74"m"6708"
53	4E0A5348/4E0B5348hh"6642"mm"5206"ss"79D2"	m"6708"d"65E5"

54	[\$-404]e"5E74"m"6708"d"65E5"	m"6708"d"65E5"
55	4E0A5348/4E0B5348hh"6642"mm"5206"	4E0A5348/4E0B5348h"65F6"mm"5206"
56	4E0A5348/4E0B5348hh"6642"mm"5206"ss"79D2"	4E0A5348/4E0B5348h"65F6"mm"5206"ss"79D2"
57	[\$-404]e/m/d	yyyy"5E74"m"6708"
58	[\$-404]e"5E74"m"6708"d"65E5"	m"6708"d"65E5"

JPN and KOR

ID	JPN Format Code	KOR Format Code
27	[\$-411]ge.m.d	yyyy"年" mm"月" dd"日"
28	[\$-411]ggge"年"m"月"d"日"	mm-dd
29	[\$-411]ggge"年"m"月"d"日"	mm-dd
30	m/d/yy	mm-dd-yy
31	yyyy"年"m"月"d"日"	yyyy"년" mm"월" dd"일"
32	h"時"mm"分"	h"시" mm"분"
33	h"時"mm"分"ss"秒"	h"시" mm"분" ss"초"
34	yyyy"年"m"月"	yyyy-mm-dd
35	m"月"d"日"	yyyy-mm-dd
36	[\$-411]ge.m.d	yyyy"年" mm"月" dd"日"
50	[\$-411]ge.m.d	yyyy"年" mm"月" dd"日"
51	[\$-411]ggge"年"m"月"d"日"	mm-dd
52	yyyy"年"m"月"	yyyy-mm-dd
53	m"月"d"日"	yyyy-mm-dd
54	[\$-411]ggge"年"m"月"d"日"	mm-dd
55	yyyy"年"m"月"	yyyy-mm-dd
56	m"月"d"日"	yyyy-mm-dd
57	[\$-411]ge.m.d	yyyy"年" mm"月" dd"日"
58	[\$-411]ggge"年"m"月"d"日"	mm-dd

JPN and KOR
(with unicode values provided for language glyphs where they occur)

ID	JPN Format Code	KOR Format Code
27	[\$-411]ge.m.d	yyyy"5E74" mm"6708" dd"65E5"
28	[\$-411]ggge"5E74"m"6708"d"65E5"	mm-dd
29	[\$-411]ggge"5E74"m"6708"d"65E5"	mm-dd

30	m/d/yy	mm-dd-yy
31	yyyy"5E74"m"6708"d"65E5"	yyyy"B144" mm"C6D4" dd"C77C"
32	h"6642"mm"5206"	h"C2DC" mm"BD84"
33	h"6642"mm"5206"ss"79D2"	h"C2DC" mm"BD84" ss"CD08"
34	yyyy"5E74"m"6708"	yyyy-mm-dd
35	m"6708"d"65E5"	yyyy-mm-dd
36	[\$-411]ge.m.d	yyyy"5E74" mm"6708" dd"65E5"
50	[\$-411]ge.m.d	yyyy"5E74" mm"6708" dd"65E5"
51	[\$-411]ggge"5E74"m"6708"d"65E5"	mm-dd
52	yyyy"5E74"m"6708"	yyyy-mm-dd
53	m"6708"d"65E5"	yyyy-mm-dd
54	[\$-411]ggge"5E74"m"6708"d"65E5"	mm-dd
55	yyyy"5E74"m"6708"	yyyy-mm-dd
56	m"6708"d"65E5"	yyyy-mm-dd
57	[\$-411]ge.m.d	yyyy"5E74" mm"6708" dd"65E5"
58	[\$-411]ggge"5E74"m"6708"d"65E5"	mm-dd

THA

ID	THA Format Code
59	t0
60	t0.00
61	t#,##0
62	t#,##0.00
67	t0%
68	t0.00%
69	t# ?/?
70	t# ??/??
71	၇/၈/၂၀၂၄
72	၃-၈၈၈-၂၂၂၂
73	၃-၈၈၈
74	၃၈၈-၂၂၂၂
75	၃၈၈
76	၃၈၈။၃၃၃

77	၂/၈/၂၀၂၃ ၁၀:၅၆
78	၂၀၂၃
79	[၂]၂၀၂၃
80	၂၀၂၃.၀
81	d/m/bb

THA (with unicode values provided for language glyphs where they occur)

ID	THA Format Code
59	t0
60	t0.00
61	t#,##0
62	t#,##0.00
67	t0%
68	t0.00%
69	t# ?/?
70	t# ??/??
71	OE27/0E14/0E1B0E1B0E1B0E1B
72	OE27-0E140E140E14-0E1B0E1B
73	OE27-0E140E140E14
74	OE140E140E14-0E1B0E1B
75	OE0A:0E190E19
76	OE0A:0E190E19:0E170E17
77	OE27/0E14/0E1B0E1B0E1B0E1B OE0A:0E190E19
78	OE190E19:0E170E17
79	[OE0A]:0E190E19:0E170E17
80	OE190E19:0E170E17.0
81	d/m/bb

iv

Format code information

Number Format Codes

Up to four sections of format codes can be specified. The format codes, separated by semicolons, define the formats for positive numbers, negative numbers, zero values, and text, in that order. If only two sections are specified, the first is used for positive numbers and zeros, and the second is used for negative numbers. If only one section is specified, it is used for all numbers. To skip a section, the ending semicolon for that section must be written.

Format for positive numbers $\#,###.00$; [Red] $(\#,###.00)$	Format for zeros 0.00 ; "sales" @
Format for negative numbers	Format for text

The first section, "Format for positive numbers", is the format code that applies to the cell when the cell value contains a positive number.

The second section, "Format for negative numbers", is the format code that applies to the cell when the cell value contains a negative number.

The third section, "Format for zeros", is the format code that applies to the cell when the cell value is zero.

The fourth, and last, section, "Format for text", is the format code that applies to the cell when the cell value is text.

The & (ampersand) text operator is used to join, or concatenate, two values.

The following table describes the different symbols that are available for use in custom number formats.

Format symbol	Description and result
0	Digit placeholder. For example, if the value 8.9 is to be displayed as 8.90, use the format #.00
#	Digit placeholder. This symbol follows the same rules as the 0 symbol. However, the application shall not display extra zeros when the number typed has fewer digits on either side of the decimal than there are # symbols in the format. For example, if the custom format is #.##, and 8.9 is in the cell, the number 8.9 is displayed.
?	Digit placeholder. This symbol follows the same rules as the 0 symbol. However, the application shall put a space for insignificant zeros on either side of the decimal point so that decimal points are aligned in the column. For example, the custom format 0.0? aligns the decimal points for the numbers 8.9 and 88.99 in a column.
. (period)	Decimal point.
%	Percentage. If the cell contains a number between 0 and 1, and the custom format 0% is used, the application shall multiply the number by 100 and adds the percentage symbol in the cell.
, (comma)	Thousands separator. The application shall separate thousands by commas if the format contains a comma that is enclosed by number signs (#) or by zeros. A comma that follows a placeholder scales the number by one thousand. For example, if the format is #.0,, and the cell value is 12,200,000 then the number 12.2 is displayed.
E- E+ e- e+	Scientific format. The application shall display a number to the right of the "E" symbol that corresponds to the number of places that the decimal point was moved. For example, if the format is 0.00E+00, and the value 12,200,000 is in the cell, the number 1.22E+07 is displayed. If the number format is #0.0E+0, then the number 12.2E+6 is displayed.
\$-+/:space	Displays the symbol. If it is desired to display a character that differs from one of these symbols, precede the character with a backslash (\). Alternatively, enclose the character in quotation marks. For example, if the number format is (000), and the value 12 is in the cell, the number (012) is displayed.
\	Display the next character in the format. The application shall not display the backslash. For example, if the number format is 0!\!, and the value 3 is in the cell, the value 3! is displayed.
*	Repeat the next character in the format enough times to fill the column to its current width. There shall not be more than one asterisk in one section of the format. If more than one asterisk appears in one section of the format, all but the last asterisk shall be ignored. For example, if the number format is 0*x, and the value 3 is in the cell, the value 3xxxxxx is displayed. The number of x characters that are displayed in the cell varies based on the width of the column.
_ (underline)	Skip the width of the next character. This is useful for lining up negative and positive values in different cells of the same column. For example, the number format _(0.0_);(0.0) aligns the numbers 2.3 and -4.5 in the column even though the negative number is enclosed by parentheses.
"text"	Display whatever text is inside the quotation marks. For example, the format 0.00 "dollars" displays 1.23 dollars when the value 1.23 is in the cell.

- @ Text placeholder. If text is typed in the cell, the text from the cell is placed in the format where the at symbol (@) appears. For example, if the number format is "Bob @" Smith" (including quotation marks), and the value "John" is in the cell, the value Bob John Smith is displayed.

Text and spacing

Display both text and numbers

To display both text and numbers in a cell, enclose the text characters in double quotation marks (" ") or precede a single character with a backslash (\). Single quotation marks shall not be used to denote text. Characters inside double quotes, or immediately following backslash shall never be interpreted as part of the format code lexicon; instead they shall always be treated as literal strings. Remember to include the characters in the appropriate section of the format codes. For example, type the format \$0.00" Surplus";\$-0.00" Shortage" to display a positive amount as "\$125.74 Surplus" and a negative amount as "\$-125.74 Shortage".

The following characters are displayed without the use of quotation marks.

\$	Dollar sign	-	Minus sign
+	Plus sign	/	Slash mark
(Left parenthesis)	Right parenthesis
:	Colon	!	Exclamation point
^	Circumflex accent (caret)	&	Ampersand
'	Apostrophe	~	Tilde
{	Left curly bracket	}	Right curly bracket
<	Less-than sign	>	Greater-than sign
=	Equal sign		Space character

Include a section for text entry

If included, a text section must be the last section in the number format. Include an "at" sign (@) in the section, precisely where the cell's text value should be displayed. If the @ character is omitted from the text section, text typed in the cell will not be displayed. To always display specific text characters with the typed text, enclose the additional text in double quotation marks (" "). For example, if "June" is typed into the cell, and the text format is "gross receipts for @" , then the cell will display "gross receipts for June".

If the format does not include a text section, text entered in a cell is not affected by the format code.

Add spaces

To create a space that is the width of a character in a number format, include an underscore, followed by the character. For example, when an underscore is followed with a right parenthesis, such as _) , positive numbers line up correctly with negative numbers that are enclosed in parentheses because positive numbers are displayed with a blank space after them exactly the width of the right parenthesis character.

Repeat characters

To repeat the next character in the format to fill the column width, include an asterisk (*) in the number format. For example, type 0*- to include enough dashes after a number to fill the cell, or type *0 before any format to include leading zeros.

Decimal places, spaces, colors, and conditions

Include decimal places and significant digits

To format fractions or numbers with decimal points, include the following digit placeholders in a section. If a number has more digits to the right of the decimal point than there are placeholders in the format, the number rounds to as many decimal places as there are placeholders. If there are more digits to the left of the decimal point than there are placeholders, the extra digits are displayed. If the format contains only number signs (#) to the left of the decimal point, numbers less than 1 begin with a decimal point.

(number sign) displays only significant digits and does not display insignificant zeros.

0 (zero) displays insignificant zeros if a number has fewer digits than there are zeros in the format.

? (question mark) adds spaces for insignificant zeros on either side of the decimal point so that decimal points align when they are formatted with a fixed-width font, such as Courier New. ? can also be used for fractions that have varying numbers of digits.

To display	As	Use this code
1234.59	1234.6	####.#
8.9	8.900	.###

.631	0.6	0.#
12	12.0	#.0#
1234.568	1234.57	
44.398	44.398	???.???
102.65	102.65	
2.8	2.8	
	(with aligned decimals)	
5.25	5 1/4	# ???/????
5.3	5 3/10	
	(with aligned fractions)	

Display a thousands separator

To display a comma as a thousands separator or to scale a number by a multiple of 1,000, include a comma in the number format.

To display As	Use this code
12000	12,000 #,###
12000	12 #,
12200000	12.2 0.0,,

Specify colors

To set the text color for a section of the format, type the name of one of the following eight colors in square brackets in the section. The color code must be the first item in the section.

[Black]	[Blue]	[Cyan]
[Green]	[Magenta]	[Red]
[White]	[Yellow]	

Instead of using the name of the color, the color index can be used, like this [Color3] for Red. Valid numeric indexes for color range from 1 to 56, which reference by index to the legacy color palette.

Note: In the format codes, [Color1] refers to the color associated with indexed="8", or black (by default), [Color2] refers to the color associated with indexed="9", or white (by default), and so on up to [Color56] referring to the color associated with indexed="63". If the color palette has been customized from default values, then the colors associated with these indexes will reflect those customizations.

Specify conditions

To set number formats that will be applied only if a number meets a specified condition, enclose the condition in square brackets. The condition consists of a comparison operator and a value. Comparison operators include: = Equal to; > Greater than; < Less than; >= Greater than or equal to, <= Less than or equal to, and <> Not equal to. For example, the following format displays numbers that are less than or equal to 100 in a red font and numbers that are greater than 100 in a blue font.

[Red][<=100];[Blue][>100]

If the cell value does not meet any of the criteria, then pound signs ("#") are displayed across the width of the cell.

Currency, percentages, and scientific notation*Include currency symbols*

To include currency symbols, place the currency symbol in the location it should when displayed.

Display percentages

To display numbers as a percentage of 100 — for example, to display .08 as 8% or 2.8 as 280% — include the percent sign (%) in the number format.

Display scientific notations

To display numbers in scientific format, use exponent codes in a section — for example, E-, E+, e-, or e+.

If a format contains a zero (0) or number sign (#) to the right of an exponent code, the application displays the number in scientific format and inserts an "E" or "e". The number of zeros or number signs to the right of a code determines the number of digits in the exponent. "E-" or "e-" places a minus sign by negative exponents. "E+" or "e+" places a plus sign by positive exponents.

Dates and times

Display days, months, and years

To display	As	Use this code
Months	1–12	m
Months	01–12	mm
Months	Jan-Dec	mmm
Months	January–December	mmmm
Months	J-D	mmmmm
Days	1–31	d
Days	01–31	dd
Days	Sun–Sat	ddd
Days	Sunday–Saturday	ddd
Years	00–99	yy
Years	1900–9999	yyyy

Month versus minutes

If "m" or "mm" code is used immediately after the "h" or "hh" code (for hours) or immediately before the "ss" code (for seconds), the application shall display minutes instead of the month.

Display hours, minutes, and seconds

To display	As	Use this code
Hours	0–23	h
Hours	00–23	hh
Minutes	0–59	m
Minutes	00–59	mm
Seconds	0–59	s
Seconds	00–59	ss
Time	4 AM	h AM/PM
Time	4:36 PM	h:mm AM/PM
Time	4:36:03 P	h:mm:ss A/P
Time	4:36:03.75	h:mm:ss.00
Elapsed time (hours and minutes)	1:02	[h]:mm
Elapsed time (minutes and seconds)	62:16	[mm]:ss
Elapsed time (seconds and hundredths)	3735.80	[ss].00

Minutes versus month

The "m" or "mm" code must appear immediately after the "h" or "hh" code or immediately before the "ss" code; otherwise, these will display as the month instead of minutes.

AM and PM

If the format contains AM or PM, the hour is based on the 12-hour clock, where "AM" or "A" indicates times from midnight until noon and "PM" or "P" indicates times from noon until midnight. Otherwise, the hour is based on the 24-hour clock.

Invalid date and time values

Cells formatted with a date or time format and which contain invalid date or time values shall show the pound sign ("#") across the width of the cell.

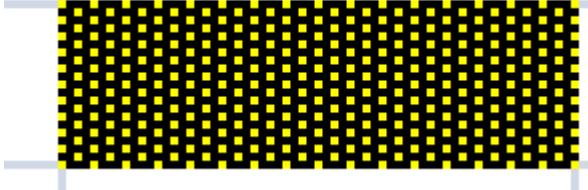
International Considerations

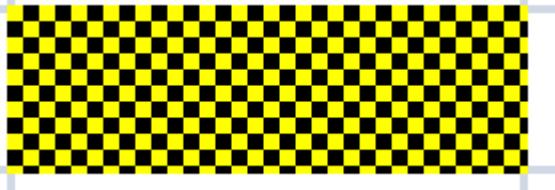
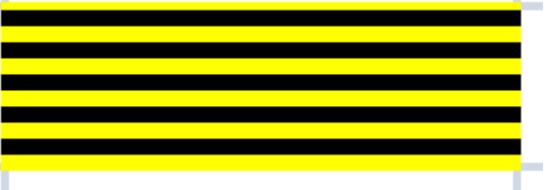
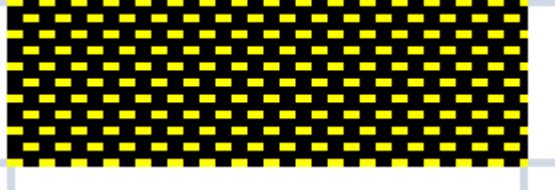
Format Code	Description
r	JPN/CHT Only. When loading in JPN locale, code becomes "ee". When loading in CHT locale, code becomes "e".

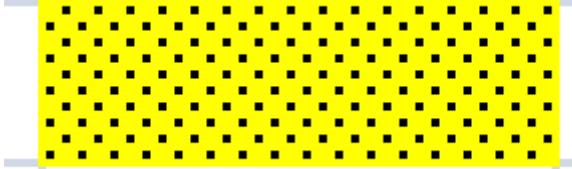
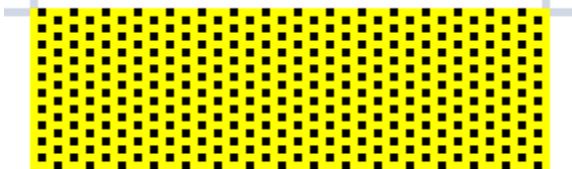
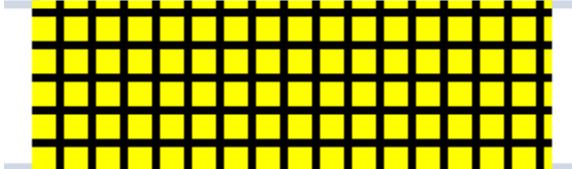
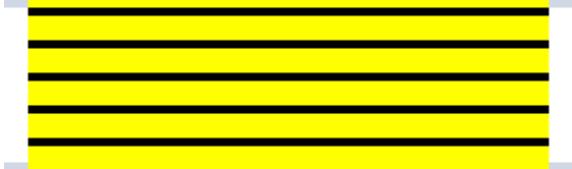
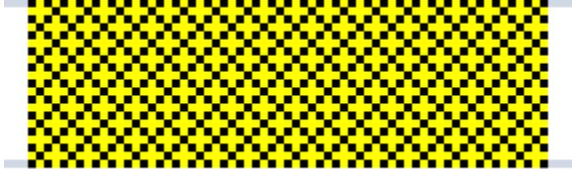
rr	JPN/CHT Only. When loading in JPN locale, code becomes "gggee". When loading in CHT locale, code becomes "e".
g	When loading in JPN locale: Single Roman character emperor reign When loading in CHT (Taiwan only) locale: treat same as "gg".
gg	When loading in JPN locale: Single Kanji character emperor reign When loading in CHT locale: Last era short name (since 1911)
ggg	When loading in JPN locale: Tow Kanji character emperor reign When loading in CHT locale: Last era long name (since 1911)
e	When loading in JPN locale: Era year When loading in CHT (Taiwan only) locale: Era year since 1912. If preceded by "g", "gg", or "ggg" then year of 1912, and year before 1912 are special, otherwise years less than 1912 are gregorian. OTHER locales: becomes "yy"
ee	When loading in JPN locale: Era year w/ leading zero When loading in CHT (Taiwan only) locale: Era year since 1911 OTHER locales: becomes "yy"
b2	Hijri calander
b1	Gregorian calendar
[\$USD-409]	Specifies currency and locale/date system/number system information. Syntax is [\$<Currency String>-<language info>]. Currency string is a string to use as a currency symbol. Language info is a 32-bit value entered in hexadecimal format. Language info format (byte 3 is most significant byte): Bytes 0,1: 16-bit Language ID (LID). Byte 2: Calendar type. High bit indicates that input is parsed using specified calendar. Byte 3: Number system type. High bit indicates that input is parsed using specified number system. Special language info values: 0xf800: System long date format

V

Fill type examples:

Fill Type	Description
Dark Down	The fill style is 'dark down'. 
Dark Gray	The fill style is 'dark gray'. 

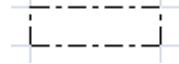
Dark Grid	The fill style is 'dark grid'. 
Dark Horizontal	The fill style is dark horizontal. 
Dark Trellis	The fill style is 'dark trellis'. 
Dark Up	The fill style is 'dark up'. 
Dark Vertical	The fill style is 'dark vertical'. 
Gray 0.0625	The fill style is grayscale of 0.0625 (1/16) value. 

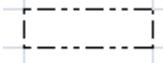
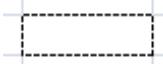
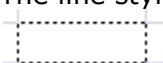
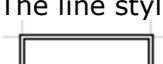
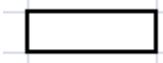
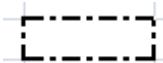
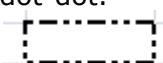
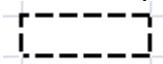
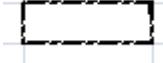
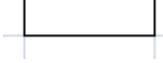
Gray 0.125	The fill style is grayscale of 0.125 (1/8) value. 
Light Down	The fill style is 'light down'. 
Light Gray	The fill style is light gray. 
Light Grid	The fill style is 'light grid'. 
Light Horizontal	The fill style is light horizontal. 
Light Trellis	The fill style is 'light trellis'. 

Light Up	The fill style is light up. 
Light Vertical	The fill style is light vertical.
Medium Gray	The fill style is medium gray. 
None	The fill style is none (no fill). When foreground and/or background colors are specified, a pattern of 'none' overrides and means the cell has no fill. 
Solid	The fill style is solid. When solid is specified, the foreground color (fgColor) is the only color rendered, even when a background color (bgColor) is also specified. 

vi

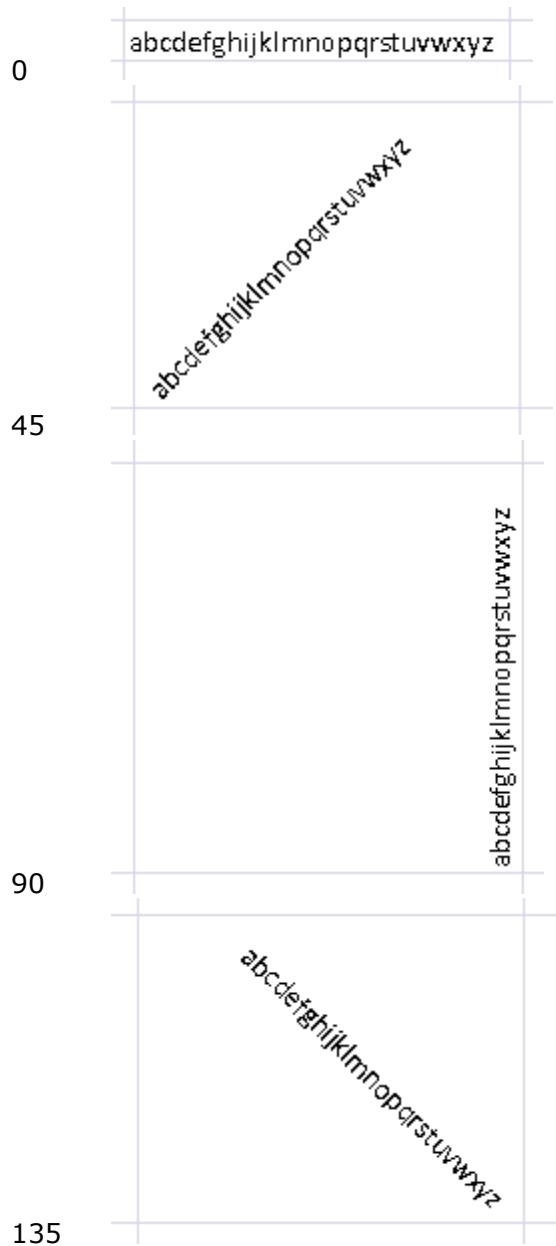
Border line examples:

Border Type	Description
Dash Dot	The line style of a border is dash-dot. 

Dash Dot Dot	The line style of a border is dash-dot-dot. 
Dashed	The line style of a border is dashed. 
Dotted	The line style of a border is dotted. 
Double Line	The line style of a border is double line. 
Hairline Border	The line style of a border is hairline. 
Medium Border	The line style of a border is medium. 
Medium Dash Dot	The line style of a border is medium dash-dot. 
Medium Dash Dot Dot	The line style of a border is medium dash-dot-dot. 
Medium Dashed	The line style of a border is medium dashed. 
None	The line style of a border is none (no border visible). 
Slant Dash Dot	The line style of a border is slant-dash-dot. 
Thick Line Border	The line style of a border is 'thick'. 
Thin Border	The line style of a border is thin. 

vii

Text rotation examples:



180

abcdefghijklmnopqrstuvwxyz

viii

Built in style ids are as follows:

ID	Cell Style Name	Example
0	Normal	<i>Normal</i>
1	RowLevel_ + level #	Depends on level: 1 = <i>RowLevel_1</i> 2 = <i>RowLevel_2</i> 3 = <i>RowLevel_3</i> 4 = <i>RowLevel_4</i> 5 = <i>RowLevel_5</i> 6 = <i>RowLevel_6</i> 7 = <i>RowLevel_7</i>

2	ColLevel_ + level #	Depends on level: ColLevel_1 1 = ColLevel_2 2 = ColLevel_3 3 = ColLevel_4 4 = ColLevel_5 5 = ColLevel_6 6 = ColLevel_7 7 =
3	Comma	1,234.00
4	Currency	\$1,234.00
5	Percent	123400%
6	Comma [0]	1,234
7	Currency [0]	\$ 1,234
8	Hyperlink	hyperlink
9	Followed Hyperlink	followed hyperlink
10	Note	Cell Style
11	Warning Text	Cell Style
15	Title	Cell Style

16	Heading 1	Cell Style
17	Heading 2	Cell Style
18	Heading 3	Cell Style
19	Heading 4	Cell Style
20	Input	Cell Style
21	Output	Cell Style
22	Calculation	Cell Style
23	Check Cell	Cell Style
24	Linked Cell	Cell Style
25	Total	Cell Style
26	Good	Cell Style
27	Bad	Cell Style
28	Neutral	Cell Style
29	Accent1	Cell Style
30	20% - Accent1	Cell Style
31	40% - Accent1	Cell Style

32	60% - Accent1	Cell Style
33	Accent2	Cell Style
34	20% - Accent2	Cell Style
35	40% - Accent2	Cell Style
36	60% - Accent2	Cell Style
37	Accent3	Cell Style
38	20% - Accent3	Cell Style
39	40% - Accent3	Cell Style
40	60% - Accent3	Cell Style
41	Accent4	Cell Style
42	20% - Accent4	Cell Style
43	40% - Accent4	Cell Style
44	60% - Accent4	Cell Style
45	Accent5	Cell Style
46	20% - Accent5	Cell Style
47	40% - Accent5	Cell Style
48	60% - Accent5	Cell Style
49	Accent6	Cell Style

50	20% - Accent6	Cell Style
51	40% - Accent6	Cell Style
52	60% - Accent6	Cell Style
53	Explanatory Text	Cell Style

ix

`lfxidtDisk` can be one of the following values:

1= String	2= Normalized string	3= Token
4= Byte	5= Unsigned byte	6= Base 64 binary
7= Hex binary	8= Integer	9= Positive integer
10= Negative integer	11= Non-positive integer	
12= Non-negative integer	13= Int	14= Unsigned int
15= Long	16= Unsigned long	17= Short
18= Unsigned short	19= Decimal	20= Float
21= Double	22= Boolean	23= Time
24= Date time	25= Duration	26= Date
27= Month	28= Year	29= Year and month
30= Day	31= Month and day	32= Name
33= Quarter name	34= NC name	35= Any URI
36= Language	37= ID	38= IDREF
39= IDREFS	40= ENTITY	41= ENTITIES
42= NOTATION	43= NMTOKEN	44= NMTOKENS
45= Any type		

X

Representations of the supported table autoformats:

ID	Description																									
0	<table border="1"> <thead> <tr> <th></th> <th>Jan</th> <th>Feb</th> <th>Mar</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>East</td> <td>7</td> <td>7</td> <td>5</td> <td>19</td> </tr> <tr> <td>West</td> <td>6</td> <td>4</td> <td>7</td> <td>17</td> </tr> <tr> <td>South</td> <td>8</td> <td>7</td> <td>9</td> <td>24</td> </tr> <tr> <td>Total</td> <td>21</td> <td>18</td> <td>21</td> <td>60</td> </tr> </tbody> </table>		Jan	Feb	Mar	Total	East	7	7	5	19	West	6	4	7	17	South	8	7	9	24	Total	21	18	21	60
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The data types supported by ODBC are noted below. For more information, see the ODBC specification.

-22=	SQL_UNSIGNED_OFFSET	-20=	SQL_SIGNED_OFFSET
-11=	SQL_GUID	-10=	SQL_WLONGVARCHAR
-9=	SQL_WVARCHAR	-8=	SQL_WCHAR
-7=	SQL_BIT	-6=	SQL_TINYINT
-5=	SQL_BIGINT	-4=	SQL_LONGVARBINARY
-3=	SQL_VARBINARY	-2=	SQL_BINARY
-1=	SQL_LONGVARCHAR	0=	SQL_UNKNOWN_TYPE
1=	SQL_CHAR	2=	SQL_NUMERIC
3=	SQL_DECIMAL	4=	SQL_INTEGER
5=	SQL_SMALLINT	6=	SQL_FLOAT
7=	SQL_REAL	8=	SQL_DOUBLE
9=	SQL_TYPE_DATE or SQL_DATE	10=	SQL_TYPE_TIME or SQL_TIME
11=	SQL_TYPE_TIMESTAMP or SQL_TIMESTAMP		
12=	SQL_VARCHAR	101=	SQL_INTERVAL_YEAR
102=	SQL_INTERVAL_MONTH	103=	SQL_INTERVAL_DAY
104=	SQL_INTERVAL_HOUR	105=	SQL_INTERVAL_MINUTE
106=	SQL_INTERVAL_SECOND	107=	SQL_INTERVAL_YEAR_TO_MONTH
108=	SQL_INTERVAL_DAY_TO_HOUR	109=	SQL_INTERVAL_DAY_TO_MINUTE
110=	SQL_INTERVAL_DAY_TO_SECOND	111=	SQL_INTERVAL_HOUR_TO_MINUTE
112=	SQL_INTERVAL_HOUR_TO_SECOND	113=	SQL_INTERVAL_MINUTE_TO_SECOND

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Supported values for a SQL data type include:

-22	SQL_UNSIGNED_OFFSET	-20	SQL_SIGNED_OFFSET
-11	SQL_GUID	-10	SQL_WLONGVARCHAR
-9	SQL_WVARCHAR	-8	SQL_WCHAR
-7	SQL_BIT	-6	SQL_TINYINT
-5	SQL_BIGINT	-4	SQL_LONGVARBINARY
-3	SQL_VARBINARY	-2	SQL_BINARY
-1	SQL_LONGVARCHAR	0	SQL_UNKNOWN_TYPE
1	SQL_CHAR	2	SQL_NUMERIC
3	SQL_DECIMAL	4	SQL_INTEGER
5	SQL_SMALLINT	6	SQL_FLOAT
7	SQL_REAL	8	SQL_DOUBLE
9	SQL_TYPE_DATE or SQL_DATE	10	SQL_TYPE_TIME or SQL_TIME
11	SQL_TYPE_TIMESTAMP or SQL_TIMESTAMP		
12	SQL_VARCHAR	101	SQL_INTERVAL_YEAR
102	SQL_INTERVAL_MONTH	103	SQL_INTERVAL_DAY
104	SQL_INTERVAL_HOUR	105	SQL_INTERVAL_MINUTE
106	SQL_INTERVAL_SECOND	107	SQL_INTERVAL_YEAR_TO_MONTH
108	SQL_INTERVAL_DAY_TO_HOUR	109	SQL_INTERVAL_DAY_TO_MINUTE
110	SQL_INTERVAL_DAY_TO_SECOND	111	SQL_INTERVAL_HOUR_TO_MINUTE
112	SQL_INTERVAL_HOUR_TO_SECOND		
113	SQL_INTERVAL_MINUTE_TO_SECOND		

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Examples of supported code page values include:

1256: Arabic (Windows)	775: Baltic (DOS)
28594: Baltic (ISO)	1257: Baltic (Windows)
852: Central European (DOS)	28592: Central European (ISO)
10029: Central European (Mac)	1250: Central European (Windows)
936: Chinese Simplified (GB2312)	950: Chinese Traditional (Big5)
10082: Croatian (Mac)	866: Cyrillic (DOS)
28595: Cyrillic (ISO)	20866: Cyrillic (KOI8-R)
21866: Cyrillic (KOI8-U)	10007: Cyrillic (Mac)
1251: Cyrillic (Windows)	28603: Estonian (ISO)
863: French Canadian (DOC)	737: Greek (DOS)
28597: Greek (ISO)	10006: Greek (Mac)
1253: Greek (Windows)	869: Greek, Modern (DOS)
1255: Hebrew (Windows)	861: Icelandic (DOS)
10079: Icelandic (Mac)	932: Japanese (Shift-JIS)
949: Korean	1361: Korean (Johab)
28605: Latin 9 (ISO)	865: Nordic (DOS)
855: OEM Cyrillic	437: OEM United States
860: Portuguese (DOS)	10010: Romanian (Mac)
20261: T.61	874: Thai (Windows)
857: Turkish (DOS)	28599: Turkish (ISO)
10081: Turkish (Mac)	1254: Turkish (Windows)
10017: Ukrainian (Mac)	65000: Unicode (UTF-7)
65001: Unicode (UTF-8)	20127: US-ASCII
1258: Vietnamese (Windows)	850: Western European (DOS)
28591: Western European (ISO)	10000: Western European (Mac)
1252: Western European (Windows)	

