Document List Structure

In OWrite version 4, in conjunction with our JS-OWrite port, we have introduced the Document List Structure (henceforth referred to as DLS). The DLS is essentially the binary document data of an OWrite document revealed in an Omnis list. An OWrite document is stored using the DLS when the document data is saved with the custom parameter kWriSaveAsList.

Example:

```
Do OWriteObj.$savedata(OutputList,kWriFmtDefault,…,kWriSaveAsList,kTrue)
```

It has always been our intention that the DLS allows developers to develop their own export format, i.e. convert the list data to whatever format they may require. To aid in this process, this document describes the OWrite DLS structure and provides detailed definitions to aid in the development of custom export/import formats using Omnis notation.
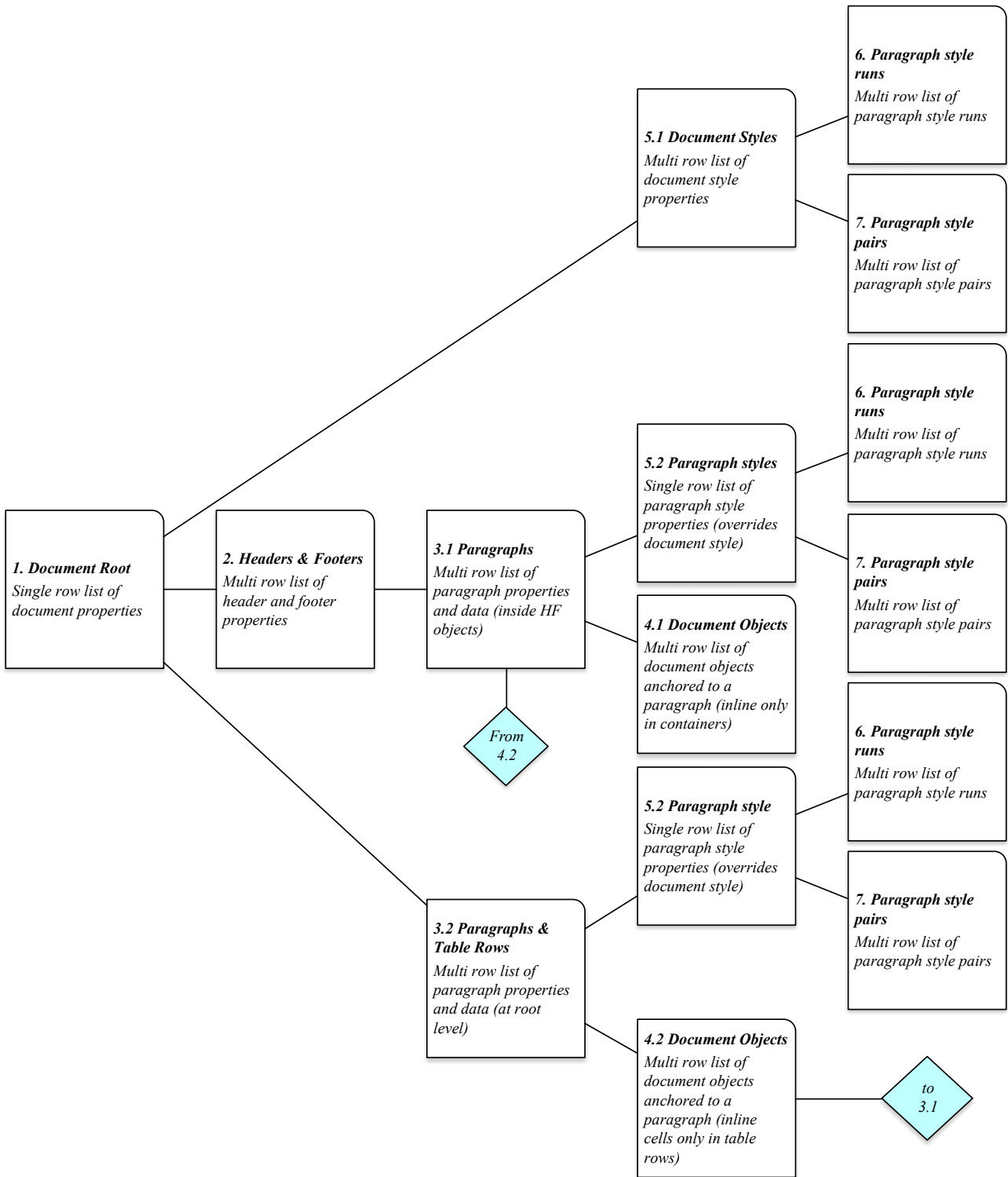
Basic Document Structure

The DLS typically contains a single row of data at the root level. At this level, the columns contain basic document information as well as further lists of document styles, the root paragraphs and document headers and footers. These root lists will contain further lists related to objects and styles, etc. This continues until all levels of the document data are described.

There are a total of seven different list definitions that encode an entire document. These are

1. The document root: document properties and document root objects
2. The header/footer list: header and footer page objects
3. The paragraph/table row list: document table rows and/or document or container paragraphs
4. The object list: document objects (i.e. pictures, fields, table cells, etc.)
5. The styles list: document or paragraph styles
6. The style runs list: paragraph style runs
7. The style pairs list: document style or paragraph style id-value pairs

The following image shows the potential hierarchical structure of an OWrite document.

6. Paragraph style runs
Multi row list of paragraph style runs

5.1 Document Styles
Multi row list of document style properties

7. Paragraph style pairs
Multi row list of paragraph style pairs

6. Paragraph style runs
Multi row list of paragraph style runs

5.2 Paragraph styles
Single row list of paragraph style properties (overrides document style)

7. Paragraph style pairs
Multi row list of paragraph style pairs

1. Document Root
Single row list of document properties

2. Headers & Footers
Multi row list of header and footer properties

3.1 Paragraphs
Multi row list of paragraph properties and data (inside HF objects)

4.1 Document Objects
Multi row list of document objects anchored to a paragraph (inline only in containers)

From 4.2

6. Paragraph style runs
Multi row list of paragraph style runs

5.2 Paragraph style
Single row list of paragraph style properties (overrides document style)

7. Paragraph style pairs
Multi row list of paragraph style pairs

3.2 Paragraphs & Table Rows
Multi row list of paragraph properties and data (at root level)

4.2 Document Objects
Multi row list of document objects anchored to a paragraph (inline cells only in table rows)

to 3.1

Detailed Document Structure

This section lists the definition of all seven lists, giving details for each list column.

1. The Document Root

Row one of the DLS contains the basic document info, document styles, header/footers and root level paragraph data.

List Column Name	Description
ObjType	This will always be kWriObjTypeDoc
DocChildList	List of root paragraphs See section *ParaChildList*.
DocVersion	Document version number (32 bit integer). The high byte indicates the platform. The low 24 bits indicate the current document version as returned by OWrite.$docversion().
DocStylesList	List of document styles. See section *DocStylesList*.
DocSelStart	Document selection start position
DocSelEnd	Document selection end position
PaperOrientation	Paper orientation (one of the kOrient… constants)
PaperSize	Paper size (one of the kPa… constants)
PaperLength	Paper length in 1/1000 mm
PaperWidth	Paper width in 1/1000 mm
PaperLeftMargin	Paper left Margin in 1/1000 mm
PaperRightMargin	Paper right Margin in 1/1000 mm
PaperTopMargin	Paper top Margin in 1/1000 mm
PaperBottomMargin	Paper bottom Margin in 1/1000 mm
DocPageView	The current view (one of the kWriView… constants)
DocScale	Document scaling factor in percent (valid range 25 to 400)
DocUserData	Custom developer data
DocDefTab	Default tab position in 1/1000 mm
DocHeaderMargin	Margin between paper edge and header content in 1/1000 mm
DocFooterMargin	Margin between paper edge and footer content in 1/1000 mm
DocFlags	Various single bit document flags (32bit integer) 1. bitDocHeadFootOddEven (0x01): If set odd and even headers are enabled 2. bitDocHeadFootFirstPage (0x02): If set first page has separate headers 3. bitDocPaperContinuous (0x04): If set paper continuous mode is enabled 4. bitDocEvalCalcs (0x08): If set document is in evaluated state 5. bitDocPrePagenated: Internal use only

List Column Name	Description
DocSpare	FOR FUTURE USE
DocHFList	List of headers and footers. See section *DocHFList*.
DocDecTabChar	The character used to identify decimal tab positions within numerical values (default is the English decimal point)
DocBulletChar	Can specify an alternative bullet character. oWrite version 5 or later.

2. The Header/Footer List (DocHFList)

This list encodes the document headers and footers. Headers and footers contain list of child paragraphs and potentially nested inline objects such as inline images and OWrite inline fields.

List Column Name	Description
ObjType	Always set to eDTHeaderFooter.
ObjChildList	List of paragraphs in header/footer See section *ParaChildList*.
ObjData	INTERNAL USE
ObjHFType	Internal constant specifying header/footer 1. eHFTypeHeadEvenDef (0x00): header for even pages when odd-even is enabled, or default header 2. eHFTypeFootEvenDef (0x01): footer for even pages when odd-even is enabled, or default footer 3. eHFTypeHeadOdd (0x02): header for odd pages when odd-even is enabled 4. eHFTypeFootOdd (0x03): footer for odd pages when odd-even is enabled 5. eHFTypeHeadFirst (0x04): header for first page when first-page-different is enabled 6. eHFTypeFootFirst (0x05): footer for first page when first-page-different is enabled
ObjHFMargin	header/footer margin from top/bottom of paper edge in 1/1000 mm

3. The Paragraph/Table Row List (ParaChildList)

This list encodes the root paragraphs and table rows[1] as well as all nested paragraphs within container objects such as text boxes and table cells. There is one list row for each paragraph or table row found within the root of the document or for each paragraph within the parent container object.

List Column Name	Description
ObjType	Either kWriObjTypePara or kWriObjTypeTableRow.

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[1] Table rows are paragraphs that only contain cell object place holders (chars with the value 0x01).

Brainy Data

List Column Name	Description
ObjChildList	List of paragraph child objects such as pictures, text boxes or calculated fields. For table rows this list will contain only table cell objects. See section *ObjChildList*.
ObjData	The paragraph text data in UTF8 format. This may contain characters with a value of 0x01 which are child object place holders objects in the ObjChildList.
ObjStylesList	List of markup styles applied to this paragraph. See section *ParaStylesList*.
ObjIsPageBreak	If true, the paragraph is in fact a page break. ObjData will be the text displayed for the page break.
the following columns only apply to table row objects	
ObjTableRowType	One of the kWriTblRow… constants
ObjTableData	Single line list that contains the data for the associated table object. This will only be set for the first row in a sequence of table rows that belong to the same table. See section *ObjTableData*.
ObjTableRowFlags	Specifies the following bits 1. bitTableRowAddedByEval (0x01): Row was added when evaluating the document. 2. bitTableRowCanSplit (0x02): Row can be split across page boundaries during evaluation of table.
ObjTableRowEvalRow	The data list row number that was used to evaluate this table row.
ObjTableRowSplitID	The ID of the first row that belongs to this set of split rows.
ObjPrePagenate	INTERNAL USE ONLY
ObjPrePagenateArr	INTERNAL USE ONLY

4. *The Object List (ObjChildList)*

This list encodes the child objects of a paragraph object. There is one row for each child object.

List Column Name	Description
ObjType	One of the kWriObjType… constants.
ObjChildList	List of child paragraphs. Only container objects such as text boxes and table cells may contain further paragraph child objects.
ObjData	Object's data. Now only used for picture objects (kWriObjTypePict).
ObjPos	Object's character position local to the parent.
ObjFormat	How the text flows around the object. One of the kWriObjFmt… constants.
ObjAlign	How the text aligns with the object vertically. One of the kWriObjAlign… constants.
ObjHorzOffset	Horizontal offset from object anchor point in 1/1000 mm.

List Column Name	Description
ObjVertOffset	Vertical offset from object anchor point in 1/1000 mm.
ObjWidth	Object width in 1/1000 mm.
ObjHeight	Object height in 1/1000 mm.
ObjResult	Result data for calculated objects.
ObjOrigWidth	Original with of object. Mainly used with picture fields.
ObjOrigHeight	Original height of object. Mainly used with picture fields.
ObjWDLeft	Left gutter size between text and object in 1/1000 mm.
ObjWDTop	Top gutter size between text and object 1/1000 mm.
ObjWDRight	Right gutter size between text and object 1/1000 mm.
ObjWDBottom	Bottom gutter size between text and object 1/1000 mm.
ObjFlags	Various object flags 1. bitObjLockAspect (0x0001): Lock picture aspect ratio 2. bitObjAutoSize (0x0002): Object auto sizes during evaluation 3. bitObjGenClick (0x0004): Object can be clicked 4. bitObjStripEmpty (0x0008): Strip empty lines from multi-line results doing evaluation 5. bitObjShowRTF (0x0010): Shows RTF when calculations are RTF based 6. bitObjNoEnter (0x0020): Container object cannot be edited 7. bitObjShowingResult (0x0040): INTERNAL USE 8. bitObjUseClickCalc (0x0080): OLD OPTION, use data calculation as a click calculation. 9. bitObjShowingRTF (0x0100): INTERNAL USE 10. bitObjEvalSplitRemovedCR (0x0200): Indicates that the cell had its CR character removed from its final row due to cell splitting. 11. bitObjAlignIsSet (0x0400): Indicates that the document data has vertical cell alignment set. If this flag is unset, the cell should default to align the content to the top of the cell.
ObjBordStyle	One of the kWriBordLine… constants.
ObjBordLnStyle	One of the kWriLine… constants
ObjBordLnSize	Border line thickness in 1/100 of a point
ObjBordColor	Border colour (Omnis colour constant or rgb value)
ObjFillColor	Fill colour (Omnis colour constant or rgb value)
ObjTopMargin	Inner text margin in 1/1000 mm for text boxes and table cells.
ObjLeftMargin	Inner text margin in 1/1000 mm for text boxes and table cells.
ObjBottomMargin	Inner text margin in 1/1000 mm for text boxes and table cells.
ObjRightMargin	Inner text margin in 1/1000 mm for text boxes and table cells.
ObjName	Object name as supplied by developer
ObjDisplay	Display text for calculated fields when not evaluated

List Column Name	Description
ObjCalc	Omnis calculation for calculated fields, text boxes, table cells and calculated pictures.
ObjToolTip	Object tooltip
ObjClickCalc	Omnis calculation which executes when object is clicked. Calculations that begin with "http" are supported.
ObjBorderSides	One of the kWriFrame… constants
ObjTableCellSpacing	NOT IMPLEMENTED
ObjTableFlags	Various table object flags (Table object only) 1. bitTablePageHeaders (0x01): generate page headers during evaluation 2. bitTablePageFooters (0x02): generate page footers during evaluation 3. bitTableAutoExtend (0x04): add new row when tabbing of last cell 4. bitTableMultiDataRows (0x08): multiple data rows are used per data row when evaluating table
ObjRectWidth	True width of object's rect
ObjRectHeight	True height of object's rect
ObjUserData	Custom data provided by developer
ObjDataSource	Used with picture fields to provide an external source for the picture data
ObjInfoType	One of the kWriObjTypeInfo… constants. Only applies when ObjType is kWriObjTypeInfo.
ObjTableResult	List data used to evaluate the table.
ObjEvalMaxHeight	The inner maximum height in 1/1000 mm for table cells and text boxes. oWrite version 5 or later.

5. *The Styles List (DocStylesList/ObjStylesList)*

The styles list contains basic style properties and potentially further lists for the style runs and style id-value pairs of a paragraph. When this list encodes the document styles it is a multi row list (one for each document style) and it specifies the style name and a further list of style id-value pairs that have been set. When it encodes a paragraph style, it is a single row list that indicates a super style (document style) and two further lists encoding the paragraphs style runs and the style-id value pairs where a style has been set for the entire paragraph. Paragraph id-value pairs, if present, override document style id-value pairs.

List Column Name	Description
StyleSuper	The name of the super style (document style). This is only set for paragraph styles.

List Column Name	Description
StyleName	The name of this style. This is only set for document styles.
StyleAfter	The name of the style that follows when the user hits return. This is only set for document styles.
StyleSpare	INTERNAL USE ONLY
StyleRunsList	List of style runs for paragraphs. Only set for paragraph styles.
StylePairsList	List of style id-value pairs for the styles that have been set.

6. *The Style Runs List (StyleRunsList)*

List of paragraph style runs specifying the character range in the paragraph to which the given style id-value pair applies. The range operates in the same way than $setselction operates, i.e. to apply the style id-value pair to the first three characters of a paragraph, the start range is zero end the end range is three.

List Column Name	Description
StyleRunStart	The start of the character range.
StyleRunEnd	The end of the character range.
StyleId	The integer ID of the style. This is one of the kWriSty… constants.
StyleValue	The value of this style.

7. *The Style Id-Value Pairs list (StylePairsList)*

This list encodes the style id-value pairs that have been set for a document or paragraph style.

List Column Name	Description
StyleId	The integer ID of the style. This is one of the kWriSty… constants.
StyleValue	The value of this style.

Document History

12 December 2020:   Updated for oWrite/jsoWrite version 5
20 December 2019:   first publication