



# **Docmosis Template Guide**

Version 4.1

Create Documents and Reports Fast from Templates

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## Docmosis Template Guide

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# Preface

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Welcome to the *Docmosis Template Guide*. This manual is intended for document template developers who will create richly formatted document layouts with the special embedded features that enables Docmosis to produce documents and reports using data supplied from other software applications.

The *Docmosis Template Guide* provides information on developing templates (in either MS Word, OpenOffice Writer or LibreOffice Writer) that will be used to produce documents. This guide assumes a level of competence in using one of those word processors and is not a reference manual for either.

OpenOffice and LibreOffice are based on the same code and can be used interchangeably by Docmosis. In this document it can be assumed that where OpenOffice is mentioned, the same applies to LibreOffice unless otherwise stated.



## Note

Don't worry. If you are competent with only one of the two word processors, you don't have to know how to use the other. In general the activities to develop the templates are the same for both tools but where there are differences between the two, this document highlights them and describes the activities for each application.

## Conventions used in this guide

This document uses typographical conventions that highlight significant parts of the text to distinguish it from normal text.

Text that looks like this...	Means this...
<<fieldname>>	A field in the document template that will be replaced with data
docmosis.###	A code instruction: either an individual line, or part of a complete module.
↵	A symbol to show that the line of code has wrapped due to the space restrictions on the page. You should remove this symbol from your code if you copy and paste code snippets from this document.
...	An indicator to signify that the preceding sequence of code instructions will execute incrementally until there is no more data in the data provider.
template.doc	A file name, a file extension or a Web site address.

Table 1: Typographical conventions

Additionally, some parts of the document are written specifically for one of the word processors mentioned. When this is the case, the paragraph has the respective icon in the left margin.



This icon...	Means this...
	The information applies to MS Word only.
	The information applies to OpenOffice Writer and LibreOffice Writer.

Table 2: Graphical conventions

## Special paragraphs

In addition to the text conventions, certain information is presented in a specific way to emphasise their information.



### Note

A note provides additional supporting information that will help you to understand a point that the author is trying to make.



### Tip

A tip provides anecdotal information to support the technical information about using the system and might be useful in helping you understand the information being presented.



### Important

Executed code on a computer rarely cause damage to hardware but may well corrupt data. Information in this form is intended to alert you to the potential for data corruption.

## General Terminology

Several terms are used in this document to identify elements of a document template. The following table provides definitions for those terms. Note that the definitions are general: for more details on these terms, you should refer to the online Help for the particular word processor with which you are developing the templates.

This term...	describes this document element...
field	a placeholder that is used by Docmosis to substitute data or to control document flow.
boilerplate	graphical and textual content that is added to a template as reusable content to avoid having the document developer recreate the content for each document. Docmosis uses boilerplate components.
header and footer	elements of a printed document that repeat on every page. Information in these elements is usually administrative information about the document.

Table 3: Document terminology



---

# 1 Introduction

---

Docmosis is an easy-to-use document generation engine which integrates with your software application to provide the seamless production of documents and reports using data supplied by your application.

The documents are produced in one or more of the following formats: MS Word; OpenOffice Writer; LibreOffice Writer; Adobe PDF and HTML using your custom-made templates. Docmosis delivers a great reporting engine by providing the following:

- cross platform compatibility;
- portability;
- scalability.

In this chapter, we provide information about the main features of a Docmosis template. Details for incorporating elements and Docmosis logic structures into a template are provided in Chapter 2, Developing Docmosis Templates.

## 1.1 Separating content from presentation

Developing applications that contain presentation logic means that when an organisation's brand image changes (such as a new company logo, different corporate font or company name), so must all the applications. Using Docmosis, all of your presentational features are developed separately from your application in commonly used word processors. This has two distinct benefits:

- The initial development of the document templates can be assigned to those who are experts in that field and they can be developed using one of the two most commonly used word processors; and
- Branding changes do not require software development support, which can be time consuming and expensive.

In addition to these benefits, Docmosis is fast: the core document processor can produce hundreds of documents in minutes in the most popular formats, which is a great improvement on other document processors currently available.

## 1.2 What are templates?

As far as Docmosis is concerned, templates are typical MS Word or OpenOffice Writer documents that may also contain fields. Docmosis uses fields to insert data, and mark the start and end of content for exclusion or repetition. Fields are standard features of these two document tools meaning Docmosis does not require any custom plugins. Docmosis supports a wide range of versions (MS Word 97 onwards, OpenOffice Writer 2.2 onwards).

As well as using fields to drive Docmosis, templates in MS Word and OpenOffice/LibreOffice Writer give ideal control over aspects such as:

- page size, margins, and columns;
- information in running headers and footers;
- typographic characteristics that describe paragraph and character styles; and
- boilerplate text, graphics and embedded field codes.

Documents created using a template inherit this pattern when they are created and no programmatic effort at all is required to benefit from these features. Once the document is rendered, it has no connection to the template from which it came other than that it is based on its characteristics. Templates can be modified as required without any concern to the documents that have been rendered in the past.



### Tip

In addition, as the paragraph and character patterns for the output are described in simple formatting terms, there is no real need to develop paragraph and character styles. However, if you are comfortable using styles, it might be advantageous to implement them for future template updates.

## 1.3 Where are the templates stored?

You can provide your templates to Docmosis in many different ways: from directories, files or Jar files (or if you are a developer, from any `InputStream`). Docmosis manages a “store” of its own templates, which acts as a cache for the templates. The cache enables Docmosis to analyse the template and to optimise it for later rendering. For more information about registering templates, refer to the *Docmosis Developer's Reference*.

## 1.4 How does document generation work?

In the simplest terms, Docmosis merges the data provided by the software application with the fields in the template to produce documents that may be:

- stored electronically, printed, viewed or any combination of these; and
- published in several document formats.

During document generation, Docmosis loads the template from the template store, merges it with data and creates the resulting document in the desired format(s). Data can be sourced from any combination of locations (databases, files, Java Objects etc), templates can include/exclude any content, tables can grow and shrink and images can be embedded. These features are discussed later in this guide.

If the template document includes an index or table of contents, Docmosis will automatically update these tables in the resulting document.





## 1.5 Template features

Modern word processors enable the development of documents with support for high-quality typesetting and layouts incorporating inline images. By inheriting these features automatically, Docmosis provides the developer and template author with an extremely powerful automatic document generation capability. Other aspects of the document that are relevant to Docmosis are detailed in this section.

### *In this section:*

- **General features.** Information about the general document features that can be used to create and exploit to deliver high-quality layouts;
- **Advanced features.** Details on the Docmosis features that can be incorporated into your template; and
- **Docmosis elements.** Details of the Docmosis elements that interact with the document generation process.

### 1.5.1 General features

Many of the integration aspects are achieved simply by using well known documentation techniques. Docmosis understands elements such as lists and tables, so there is no need to learn new techniques to develop templates for use with Docmosis.

The general aspects of a document template include the creation of branding features, layout features and static text elements. In order to create a document template for use with Docmosis, the template author can simply create a document and direct Docmosis using the following features in your word processor:

Word Feature	Writer Feature	Controls
Plain text markup	Plain text markup	Data insertion and document flow
Mail merge fields	Input fields	Data insertion and document flow
Bookmarks	Image properties	Image insertion

### 1.5.2 Advanced features

To generate sophisticated documents of value to your application, fields are interpreted by Docmosis. These fields can direct Docmosis providing:

- Insertion of text or image data into the body, headers and footers and tables;
- Inclusion or exclusion of static or dynamic content;
- Hyperlink Insertion;
- Repeating of content;
- Table row repetition or exclusion;
- Table column removal;



- Numbered and bullet list expansion;
- Template merging

## 1.5.3 Docmosis elements

All Docmosis “elements” are controlled by fields, except for image insertion which is controlled by bookmarks or image properties. Each element is discussed in detail in this guide. In general, elements may be singular (such as a text insertion) or may be paired having a start and end marker.

### 1.5.3.1 Field Reference

The following table provides a quick reference to the elements and their syntax. The names of the fields must match exactly for the document generation to succeed.

Element	Description	Closing Element
<<name>>	Replace this field by the data referenced by “name”.	
<<{expr}>>	Replace this field with the results of the given expression.	
<<link:name>> <<link_name>>	Insert a hyperlink at this location, using the URL from the data referenced by “name”. The data can optionally specify display text by using the form: <text> <url> eg: “docmosis https://www.docmosis.com”	
<<\$abc=name>>  <<\$abc=10.2>> <<\$abc='Fred'>> <<\$abc=true>> <<\$abc=null>>	Lookup the data associated with “name” and assign it to the variable “abc”.  Assign the number 10.2 to variable \$abc Assign the string “Fred” to variable \$abc Assign the boolean true to variable \$abc Assign the value null to variable \$abc	
<<\$abc>>	Lookup the variable “abc” and render its value	
<<cs_name>> <<cs_{expr}>> <<cs_\$abc>>	Content between the opening element and the closing element is included or excluded depending on the value associated with “name” or the expression “expr” or the variable “abc”. The end tag must match exactly, or may be anonymous: <<es_>>.	<<es_name>> <<es_{expr}>> <<es_\$abc>> <<es_>>
<<else_name>> <<else_{expr}>> <<else>>	This is the “else” tag related to a <<cs_>> tag to provide the “else” and “else if” options to a condition.	
<<rs_name>> <<rs_\$abc>>  <<rs_name:step2>>  <<rs_name:step2down>>	Content between the opening element and closing element is repeated whilst there is data associated with “name” or the variable “abc”.  “stepN” indicates that the data (“name”) should be iterated in steps of N size. When stepping is used, the variables \$i1, \$i2,...\$iN are created automatically so you can reference the items available in each step.  “stepNdown” indicates that the data (“name”) should be iterated in steps of N size and data should be presented in a “down”-ward manner. Variables \$i1, \$i2,... \$iN are created automatically.	<<es_name>> <<es_\$abc>> <<es_name:step2>> <<es_>>



Element	Description	Closing Element
<pre>&lt;&lt;cr_name&gt;&gt; &lt;&lt;cr_{expr}&gt;&gt; &lt;&lt;cr_\$abc&gt;&gt;</pre>	<p>Include the following table rows depending on the value associated with "name" or expression "expr" or the variable "abc".</p>	<pre>&lt;&lt;er_name&gt;&gt; &lt;&lt;er_{expr}&gt;&gt; &lt;&lt;er_\$abc&gt;&gt; &lt;&lt;er &gt;&gt;</pre>
<pre>&lt;&lt;rr_name&gt;&gt; &lt;&lt;rr_\$abc&gt;&gt;  &lt;&lt;rr_name:step2&gt;&gt;  &lt;&lt;rr_name:step2down&gt;&gt;</pre>	<p>The rows between the opening element row and the closing element row are repeated whilst there is data associated with "name" or the variable "abc".</p> <p>"stepN" indicates that the data ("name") should be iterated in steps of N size. When stepping is used, the variables \$i1, \$i2,...\$iN are created automatically so you can reference the items available in each step.</p> <p>"stepNdown" indicates that the data ("name") should be iterated in steps of N size and data should be presented in a "down"-ward manner. Variables \$i1, \$i2,... \$iN are created automatically.</p>	<pre>&lt;&lt;er_name&gt;&gt; &lt;&lt;er_\$abc&gt;&gt; &lt;&lt;er &gt;&gt;</pre>
<pre>&lt;&lt;noTableRowAlternate&gt;&gt;</pre>	<p>Disable automatic alternate-colouring of table rows. This can appear in a table to disable for the table or appear in the document body to disable for all following tables.</p>	
<pre>&lt;&lt;cc_name&gt;&gt; &lt;&lt;cc_{expr}&gt;&gt; &lt;&lt;cc_\$abc&gt;&gt;</pre>	<p>Include or exclude the table column containing this field depending on the value associated with "name" or the expression "expr" or the variable "abc".</p>	
<p>Image &lt;&lt;img_</p> <p><i>MS Word:</i> bookmarked with label "img_name"</p> <p><i>OpenOffice or LibreOffice Writer:</i> image named "img_name"</p> <p>(deprecated "bm_name")</p>	<p>Replace an image in the template with the image data associated with "name" using the default scaling settings (which is stretch).</p> <p>The default setting can be changed by setting the Docmosis property: docmosis.analyzer.image.scaling.default to fit or stretch.</p> <p>See the Docmosis Developer's Reference for information about setting properties.</p>	
<p>Image &lt;&lt;imgstretch_</p> <p>bookmarked with label or named "imgstretch_name"</p>	<p>Replace an image in the template with the image data associated with "name" and stretch the new image to match the template image placeholder.</p>	
<p>Image &lt;&lt;imgfit_</p> <p>bookmarked with label or named "imgfit_name"</p>	<p>Replace an image in the template with the image data associated with "name" and fit the new image into the template image placeholder preserving the new image aspect ratio.</p>	
<pre>&lt;&lt;ref:sub1.doc&gt;&gt;</pre>	<p>Insert the template named "sub1.doc" at this location.</p>	
<pre>&lt;&lt;refLookup:name&gt;&gt;</pre>	<p>Lookup "name" in the data to get the name of the template to insert at this location.</p>	
<pre>&lt;&lt;html:name&gt;&gt;</pre>	<p>Lookup "name" in the data and inject the data as HTML content into the document at this location</p>	

Table 4: Docmosis element quick reference



**Note**

Care must be taken with all fields when using MS Word documents as templates if you are using MERGE FIELDS. You must avoid SPACES in a field name as a space will truncate the field and sometimes Docmosis will not be able to detect this. The good news is that most of the time this will turn up as an obvious error reported during document generation. If you are using plain-text fields (rather than merge fields) this problem does not occur.



## 1.5.3.2 Expressions

Docmosis uses { and } to delimit an expression to be evaluated. Expressions are a powerful way of retrieving and manipulating data and the syntax supports:

- Data lookup (get **data** by name)
- Literals (eg **'abc'** or **123**)
- Operators (eg **+** to add numbers and strings, **\*** to multiply numbers)
- Functions (eg **titleCase(name)**)

Expressions can be used for simple data insertion:

```
<<{ 'Ms. ' + lastName}>>
```

and in conditional sections:

```
<<cs_{itemCount < 10}>>
...
<<es_>>
```

and where template-variables are set:

```
<<$myVar={ 'Ms. ' + lastName}>>
```

The following table shows some examples of expressions in use. The sections to follow detail the operators and functions available.

Element	Description
<<{10 * 3.0}>>	Calculate 10 multiplied by 3.0
<<{amount * qty}>>	Lookup data elements "amount" and "qty" and multiply them together.
<<{round(item/10)}>>	Lookup data element "item", divide it by 10 then round the result.
<<cs_{a<10}>>	Lookup data element "a" and see if it is <b>less than</b> 10 numerically. If "a" is not numeric, a string comparison is performed automatically.
<<cs_{a='fred'}>>	Lookup data element "a" and see if it is <b>equal to</b> the String literal "fred".
<<cs_{\$a!=10}>>	Lookup the variable "a" and see if it is <b>not equal to</b> the numeric value 10. If variable "a" does not resolve to a numeric value, a String comparison is performed.
<<cs_{a=null}>>	Lookup the data element "a" and determine if it's value is null
<<cs_{\$a}>>	Determine if the value of the template variable \$a is true

## 1.5.3.3 Expression Operators

The following operators are supported by the expression syntax:

Operator	Description
(	open parentheses
)	close parentheses
+	addition (for numbers and strings)
-	subtraction
*	multiplication
/	division



Operator	Description
%	modulus
+	unary plus
-	unary minus
=	equal (for numbers and strings)
==	equal (for numbers and strings)
!=	not equal (for numbers and strings)
<	less than (for numbers and strings)
<=	less than or equal (for numbers and strings)
>	greater than (for numbers and strings)
>=	greater than or equal (for numbers and strings)
&&	boolean and
	boolean or
!	boolean not

Typical “Operator precedence” rules apply to determine the order of processing (highest to lowest):

- ( open parentheses, ) close parentheses
- + unary plus, - unary minus, ! boolean not
- \* multiplication, / division, % modulus
- + addition, - subtraction
- < less than, <= less than or equal, > greater than, >= greater than or equal
- = equal, != not equal
- && boolean and
- || boolean or



### 1.5.3.4 General Functions

The following **General** functions are supported by the expression syntax:

Function	Synopsis
map	<p>A function to map one value to another.</p> <pre>map(key, test1, replace1 [,test2, replace2 ...] [,default])</pre> <p>where:</p> <ul style="list-style-type: none"><li>key = the data value</li><li>test1 = the first value to compare with the key</li><li>replace1 = the value to use if test1 matches the key</li><li>test2 = the second value to compare with the key</li><li>replace2 = the value to use if test2 matches the key</li><li>...</li><li>default = the value to use if no matches are made</li></ul> <p>For Example:</p> <pre>&lt;&lt;{map(gender, 'M', 'Male', 'F', 'Female', 'Other')}&gt;&gt;</pre> <p>Will lookup "gender" in the data and if it equals "M" the value "Male" will be used.</p>

### 1.5.3.5 String Functions

The following **String** functions are supported by the expression syntax:

Functions	Synopsis
charAt	<p>Returns the character at the requested position in the source string.</p> <pre>charAt (string, position)</pre> <p>where:</p> <ul style="list-style-type: none"><li>string = the string to lookup the character in</li><li>key = the position of the required character, starting from 0 for the first position.</li></ul> <p>For Example:</p> <pre>&lt;&lt;{charAt('abcdefg',3)}&gt;&gt; returns the character "d"</pre> <pre>&lt;&lt;{charAt(idNumber,6)}&gt;&gt; will lookup "idNumber" in the data. If idNumber= "ID474-K234" then the character returned will be "K".</pre>



Functions	Synopsis
<p><b>endsWith</b></p>	<p>Checks to see if a string ends with a given string.</p> <pre>endsWith (mainString, subString)</pre> <p>where:</p> <pre>mainString = the string to check subString = the string to look for at the end of mainString</pre> <p>For Example:</p> <pre>&lt;&lt;{endsWith('The first string', 'ing')}&gt;&gt; returns the value "true"</pre> <p>Useful when creating a conditional section. For example, this conditional section will only display the "serialNum" field if it ends with "ZZZ".</p> <pre>&lt;&lt;cs_{endsWith(serialNum, 'ZZZ')}&gt;&gt; &lt;&lt;serialNum&gt;&gt; &lt;&lt;es_&gt;&gt;</pre>
<p><b>equalsIgnoreCase</b></p>	<p>Compares to strings, regardless of case.</p> <pre>equalsIgnoreCase (string1, string2)</pre> <p>where:</p> <pre>string1 = the first string string2 = the second to compare to the first string</pre> <p>For Example:</p> <pre>&lt;&lt;{equalsIgnoreCase ('Bob', 'bob')}&gt;&gt; returns the value "true"</pre>
<p><b>length</b></p>	<p>Returns the length of a string.</p> <pre>length (string)</pre> <p>where:</p> <pre>string = the string to check the length of</pre> <p>For Example:</p> <pre>&lt;&lt;{length('Bob')}&gt;&gt; returns the number "3.0"</pre> <p>Useful when creating a conditional section. For example, this conditional section will only display the text if "refNo" is set.</p> <pre>&lt;&lt;cs_{length(refNo)&gt;0}&gt;&gt; Ref Num : &lt;&lt;refNo&gt;&gt; &lt;&lt;es_&gt;&gt;</pre>
<p><b>replace</b></p>	<p>Replaces characters in the source string with new characters.</p> <pre>replace (string, oldChar, newChar)</pre> <p>where:</p> <pre>string = the string oldChar = the character to find in the string newChar = the character to use in place of the oldChar</pre> <p>For Example:</p> <pre>&lt;&lt;{replace(customerVIN,'o','0')}&gt;&gt;</pre> <p>If the data contains customerVIN = "JHMAB5227EC8oo65o"</p> <p>Then the replace function will turn all the letter "o" chars to the number "0" so the result looks like this : "JHMAB5227EC800650"</p>



Functions	Synopsis
split	<p>Split a string into parts that can be displayed separately.</p> <pre>split (string, splitChar, index)</pre> <p>where:</p> <pre>string = the string splitChar = the character to use as a delimiter index = once split into parts, index identifies the part to be used - counting from 0.</pre> <p>For Example:</p> <pre>&lt;&lt;{split('John Mathews 47 Approved', ' ', 1)}&gt;&gt; returns "Mathews"</pre> <pre>&lt;&lt;{split(cityStateZIPCountry, ';', 1)}&gt;&gt; with cityStateZIPCountry = "Charleston;West Virginia;29402;United States" will return "West Virginia"</pre>
startsWith	<p>Checks to see if a string starts with a given string.</p> <pre>endsWith (mainString, subString)</pre> <p>where:</p> <pre>mainString = the string to check subString = the string to look for at the start of mainString</pre> <p>For Example:</p> <pre>&lt;&lt;{startsWith('The first string', 'The')}&gt;&gt; returns the value "true"</pre> <p>Useful when creating a conditional section. For example, this conditional section will only display the "VIN" field if it starts with "1VW".</p> <pre>&lt;&lt;cs_{startsWith(VIN, '1VW')}&gt;&gt; &lt;&lt;VIN&gt;&gt; &lt;&lt;es_&gt;&gt;</pre>
substring	<p>Display a subsection of a string given starting and finishing indexes.</p> <pre>split (string, start, finish)</pre> <p>where:</p> <pre>string = the string start = the position in the string that will now become the first character. Indexing starts at 0. finish = the position in the string that marks where to cut the string. The character before the cut makes it in to the substring. The finish character doesn't.</pre> <p>For Example:</p> <pre>&lt;&lt;{substring('0123456', 2, 5)}&gt;&gt; returns "234"</pre> <pre>&lt;&lt;{ substring(LatLong, 0, 6)}&gt;&gt; with LatLong = "31.9088983S115.8049265E" will return "31.908"</pre>





Functions	Synopsis
<p>titleCase</p>	<p>Changes the string so that the first character of each word is a capital letter.</p> <pre>length (string)</pre> <p>where:</p> <pre>string = the string to convert</pre> <p>For Example:</p> <p>&lt;&lt;{ titleCase ('bob mathews')}&gt;&gt; returns "Bob Mathews"</p> <p>&lt;&lt;{titleCase (firstName+ ' ' + lastName)}&gt;&gt; with data of firstName = "bob" and lastName = "MATHEWS" also returns "Bob Mathews"</p>
<p>toLowerCase</p>	<p>Returns the string using all lower case characters.</p> <pre>length (string)</pre> <p>where:</p> <pre>string = the string to convert</pre> <p>For Example:</p> <p>&lt;&lt;{toLowerCase('Bob Mathews')}&gt;&gt; returns "bob mathews"</p>
<p>toUpperCase</p>	<p>Returns the string using all lower case characters.</p> <pre>length (string)</pre> <p>where:</p> <pre>string = the string to convert</pre> <p>For Example:</p> <p>&lt;&lt;{toUpperCase('Bob Mathews')}&gt;&gt; returns "BOB MATHEWS"</p>
<p>trim</p>	<p>Removes leading and trailing spaces from a string.</p> <pre>trim (string)</pre> <p>where:</p> <pre>string = the string to strip spaces from</pre> <p>For Example:</p> <p>&lt;&lt;{trim(productID)}&gt;&gt; Where productID = " 12CVCV123-454  " returns "12CVCV123-454"</p>



### 1.5.3.6 Numeric Functions

The following **Numeric** functions are supported by the expression syntax.

Any of the number literals (eg: "153.57") in the examples below could be replaced with a "name" that Docmosis will look for in the data.

Functions	Synopsis
abs	Returns the absolute value of the number. <code>abs (number)</code>  For Example: <<{abs(-153.57)}>> returns "153.57"  <<{abs(temp)}>> If the data has temp = "-273.15" returns "273.15"
ceil	Returns the next largest whole number. <code>ceil (number)</code>  For Example: <<{ceil(153.57)}>> returns "154.0"
floor	Returns the next smallest whole number. <code>floor (number)</code>  For Example: <<{floor(153.57)}>> returns "153.0"
max	Returns the larger of the two numbers. <code>max (number1, number2)</code>  For Example: <<{max(53.5,23.1)}>> returns "53.5"
min	Returns the smaller of two numbers. <code>min (number1, number2)</code>  For Example: <<{min(53.5,23.1)}>> returns "23.1"
pow	Returns the power of two numbers. <code>pow (number1, number2)</code>  For Example: <<{pow(7,2)}>> returns 7 to the power of 2, so "49.0"



Functions	Synopsis
random	Returns a random number between 0 and 1. <code>random()</code>  For Example: <<{round(random()*100)}>> returns a random number between 0 and 100.
round	Rounds the number to the specified number of places. <code>round (number [, places])</code> where: number = the number to round. places = the number of decimal places required. If not specified then round to zero decimal places.  For Example: <<{round(153.75)}>> returns "154" <<{round(153.73455,2)}>> returns "153.73"
sqrt	Returns the square root of a number <code>sqrt (number)</code>  For Example: <<{sqrt(81.0)}>> returns "9.0"

### 1.5.3.7 Formatting Functions

The following **Formatting** functions are supported by the expression syntax:

Functions	Synopsis
numFormat	Format a number using the based on the format provided and the locale. <code>numFormat (value, format [, locale])</code> where: value = the number to format format = the format to apply. Eg: '#,###.00' locale = optional locale to use. Country or language name or code. Eg: 'GERMAN', 'USA'.  <b>See 3.1.4.1 for formatting syntax.</b>  For Example: <<{numFormat(totalPrice, '\$#,###.00' )}>> where totalPrice = "1457.1" will return the value "\$1,457.10"



Functions	Synopsis
dateFormat	<p>Format the value based on the output and input Formatting strings.</p> <pre>dateFormat (value [, outputFormat [, inputFormat] ])</pre> <p>where:</p> <ul style="list-style-type: none"> <li>value = the data value to format</li> <li>outputFormat = optional - the output format to apply</li> <li>inputFormat = optional - the format used to decode the input data value</li> </ul> <p><b>See 3.1.2 for formatting syntax.</b></p> <p>For Example:</p> <p>&lt;&lt;{dateFormat('31-DEC-15')}&gt;&gt; returns "31 Dec 2015" because it uses the default output format ('dd MMM yyyy') and the value matches one of the known standard input formats.</p> <p>&lt;&lt;{dateFormat('2015-12-15', 'EEEE, dd MMMM yyyy', 'yyyy-MM-dd')}&gt;&gt; Returns "Tuesday, 15 December 2015"</p>

### 1.5.3.8 Nesting

Elements can be "nested" with regards to the way they lookup data. For example, <<hotel.floor>> typically would refer to the floor within a hotel object. The period "." character represents the delimiter between one level of data and the next. This is described in detail later.

### 1.5.3.9 Range Specifiers

Data elements can also be referenced by **ranges** of values Docmosis should lookup. This provides a fair amount of power within the template to select the values of interest. It depends on the context of the element as to whether it is allowed to produce multiple values (and Docmosis will flag errors where inappropriate use is made). For example, a repeating section is expected to produce multiple values, but a simple lookup field is not.

The following table details the types of range specifier available.

Element	Description
<<hotel[0]>>	The first hotel (indexing starts at zero)
<<hotel[F]>>	The first hotel (equivalent to index zero)
<<hotel[L]>>	The last hotel
<<hotel[*]>>	All hotels
<<hotel[F3]>>	The first 3 hotels
<<hotel[L3]>>	The Last 3 hotels
<<hotel[1,2,4]>>	The hotels at indexes 1,2 and 4
<<hotel[1-3,L2]>>	The hotels at indexes 1 to 3 inclusive and the last 2
<<hotel[0-L2]>>	All but the last 2 hotels
<<hotel[3].floor[L].room[0].name>>	The name of the first room of the last floor of the hotel at index 3



### 1.5.3.10 Built-In Variables

Docmosis provides some built-in variables to assist with common data lookup requirements.

Variable	Description
<<\$top>> or <<\$root>>	The root of the data regardless of the current position or context in the template
<<\$this>> or <<\$current>>	The current source of data in the current position in the template. This allows for anonymous data lookups from arrays or collections such as <<\$current[0]>>.
<<\$parent>>	The parent or container of data in the current context of the template. Allows data lookup in the current "hotel" when the current context is a "floor" for example.
<<\$idx>>	The current index when iterating through a data set. For example, if we are repeating over all hotels, \$idx would report the index of the hotel we are up to. Note that <<\$rowidx>> is the same unless using a step size greater than 1.
<<\$itemnum>>	Similar to \$idx but is the number of the item which we are currently addressing. Item numbering starts at 1. Note that <<\$rownum>> is the same unless using a step size greater than 1.
<<\$size>>	The size of the current repeating data set. For example if we are repeating over all hotels, \$size would be the number of hotels.
<<\$i1>>, <<\$i2>>, .. <<\$iN>>	References to the Nth item when repeating data in "steps of N". For example <<rs_people:step3>> steps through the people in "steps of 3" and Docmosis automatically creates variables \$i1, \$i2 and \$i3 to access each element in the step.  For more information about the use of "steps of N" see sections 2.10 Repeating sections (page 38) and 2.11.2 Repeating rows (page 43).
<<\$idx1>>, <<\$idx2>>, .. <<\$idxN>>	The absolute indexes of the items when repeating with "steps of N" (as described above) starting at zero.
<<\$itemnum1>>, <<\$itemnum2>>, ... <<\$itemnumN>>	The absolute indexes of the items when repeating with "steps of N" (as described above) starting at one.
<<\$rownum>>	The current row number (starting at 1) when repeating (either repeating rows or repeating sections). This is most useful when using the "stepping" directives and the \$itemnum is not suitable.
<<\$rowidx>>	The current row number (starting at 0) when repeating (either repeating rows or repeating sections). This is most useful when using the "stepping" directives and the \$idx is not suitable.



#### Note

Variables can also be referenced using `var_` instead of `$`. This means <<\$name>> is equivalent to <<var\_name>>. This is particularly useful for bookmarking images using variables in MS Word, where you cannot use the \$ symbol in the bookmark name.



### 1.5.3.11 Error Handling

Docmosis offers two ways to deal with errors encountered in templates during processing:

1. write the error INTO the resulting document - errors are highlighted and footnotes are added to offer details and suggestions as appropriate
2. throw an exception and abort document production

This behaviour is property controlled since it is expected to be related to the type of environment in which Docmosis is running. The default behaviour is write errors into the document, but this is not always advisable. See the Docmosis Developer's Reference for more information.



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## 2 Developing Docmosis Templates

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The basic steps for developing a template are:

1. create the layout, boilerplate content and typesetting characteristics of a document;
2. incorporate the Docmosis elements (fields).

The boilerplate content can include sophisticated structures using headings, lists, tables, images, and headers and footers.



### Tip

When creating a template, use the word processor of your choice from the two identified.

This chapter provides instructions for the inclusion of the supported fields; it is divided into sections that discuss the basic aspects through to some advanced techniques. In general, the information does not cover typesetting of documents but does provide information where necessary. Most of the information in this chapter is relevant to both word processors: where they differ, information is provided for each case.



### Important

All the procedures in this chapter assume that you understand the techniques required for the particular word processor and that you have a document open in the word processor on which you can perform the procedure.

In addition, the procedures use menu-based instructions for consistency.

---

## 2.1 Incorporating Docmosis elements

You can add Docmosis "fields" at any location in a document template. Each field must have an appropriate property name that identifies it and associates it with an element of the data that will be supplied to Docmosis. During document generation, Docmosis expects the application to provide values and logical data structures with the same names and structure as the elements that exist in the template.

Docmosis supports fields using:

- plain text mark-up
- Merge Fields in MS Word
- Input Fields in OpenOffice Writer or LibreOffice Writer

Plain text mark-up is the simplest to use since there are no dialogs to interact with and what you see is what you get. With both Word and Writer, a field (Merge Field or Input Field) can have a different value displayed to what it represents "behind the scenes".



## 2.2 Using Plain Text Mark-Up

Plain text mark-up is the easiest method of creating fields in Docmosis templates. By default, the start of a field is annotated by << and the end of a field by >>. So to create a field that looks up "personName", you would simply type <<personName>> into the document.

So as to be as unobtrusive as possible to the text of a template, Docmosis is strict about identifying plain text fields and will ignore invalid mark-up assuming it is plain text. For example, <<personName> will be ignored and left as plain text because a closing ">" character is missing. A **single** space between the << and the name or the name and >> is allowed, but more spaces will also mean the field is not recognised. The following table shows the typical types of error that will result in a field not being recognised.

Example Field	Valid	Problem
<<personName>>	YES	Correct field. Docmosis will identify and substitute.
<<personName>	NO	Missing trailing >
<personName>>	NO	Missing leading <
<< personName>>	NO	2 spaces after leading <<
<<personName >>	NO	2 spaces before trailing >>
< <personName>>	NO	Space after leading <
<<personName> >	NO	Space before trailing >

Plain text mark-up is controlled by the properties:

Property	Default	Description
docmosis.analyzer.field.plainText.prefix	<<	Start of field delimiter
docmosis.analyzer.field.plainText.suffix	>>	End of field delimiter

The plain text mark-up settings can be changed or disabled on a case by case basis using features of the DocumentProcessor class. For more information about setting Docmosis properties, please see the Docmosis Developer's Reference.

## 2.3 Using Document Fields As Mark-Up

Docmosis also supports the use of the "document fields" supplied by the Word and Writer word processors such as *merge* fields and *input* fields.

The **advantages** of using these document fields include:

1. you can display text that is different from the actual field codes for Docmosis. For example the following field appears as:  
 «friends»  
 but may in fact represent:  
 «friends[0].lookupName»  
 so it appears smaller or more succinct in the document.



2. a logical separation of content and control/mark-up. It is clear to both users and the Docmosis engine what is plain content and what is Docmosis mark-up.

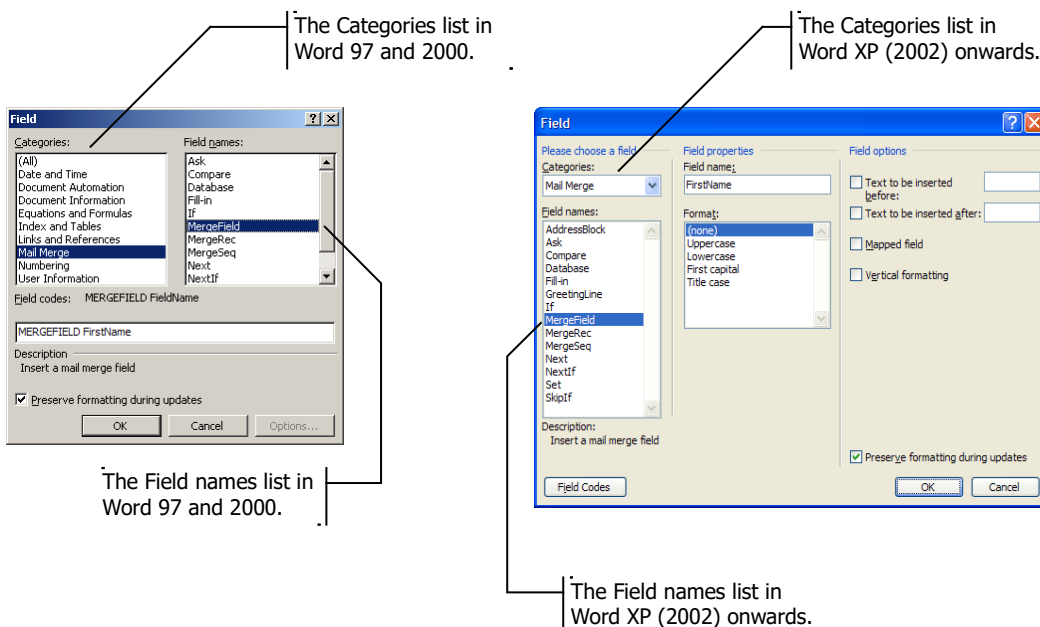
The **disadvantages** of using document fields include:

3. a field can be confusing or misleading because its true lookup value is hidden
4. more effort is required to work with these fields via popup dialogs or switching field codes on and off
5. with Word merge fields the "display" value can be accidentally lost (replaced with the underlying lookup value) if the fields in the document are "updated"
6. the latest versions of Word make it difficult to simply insert a merge field, trying to guide the user to link up to a data source. The options are to use plain text fields, type the field codes manually, or copy a merge field from another document then edit it to what you require.

The following sections describe how to insert document fields using the features of Word and Writer.

### 2.3.1 About MS Word versions

In general, the procedures to implement the Docmosis features into templates are consistent in all versions of MS Word. However, the layout of the *Field* dialog box has changed over the years. The following illustrations show the dialog box layouts for the different versions and identifies the areas that are relevant to Docmosis templates.



*The Field dialog box layouts in different versions of MS Word*

Newer versions of Word (from 2007) make it difficult to insert a merge field manually. Your options include:

1. use plain text mark-up instead of document fields

2. copy a merge-field from another document then edit it
3. turn field-codes on and manually construct a field. Please refer to Word's help for details about manually entering field codes.

### 2.3.2 To Insert A Field Using MS Word

This section describes how to insert a document field. It is generally simpler to use plain text mark-up as described in section 2.2 Using Plain Text Mark-Up.

To insert a field that will look up a value for "firstName":



For versions prior to Word 2007:

1. Position the insertion point at the location for the field.
2. Select **Insert > Field**.
3. In the *Field* dialog box, select Mail Merge from the **Categories** list.
4. Select MergeField from the Field names list.
5. Type `firstName` into the appropriate field (see About MS Word versions earlier).
6. Click **OK**.



#### Tip

By default, MS Word displays the same text in the merge field as the title you enter in the *Field* dialog box. You may change the text that is displayed without changing the title of the merge field. Simply edit the text that appears between the angle brackets. Be warned though that this is generally not a good idea because if anyone updates the field codes in the document, the "display" name will be reverted back to the real contents.



#### Tip

In MS Word documents it is a good idea to frequently ensure the merge fields are displaying what they actually are going to look up. This can be achieved by selecting the fields (or the whole document) and pressing F9 (update field codes).

For versions from Word 2007:

1. Copy the field from another document and then edit

The reasons for the above limitation are described in 2.3.1 About MS Word versions.

### 2.3.3 To Insert A Field Using OpenOffice / LibreOffice Writer



This section describes how to insert a document field. It is generally simpler to use plain text mark-up as described in section 2.2 Using Plain Text Mark-Up.

To insert a field that will look up a value for "firstName":

1. Position the insertion point at the location for the field.



2. Select **Insert > Fields > Other**.
3. In the *Fields* dialog box, select the **Functions** tab.
4. Select Input Field from the **Type** list.
5. Type `firstName` into the **Reference** field.
6. Click **Insert**.
7. When the *Input Fields* dialog box prompts you, in the field below the one that contains the field reference, type the text that you want to be displayed in the document to identify the field. Keeping this text consistent with the text in the Reference is a good idea since it can avoid mix-ups.



**Note**

OpenOffice Writer presents the field information differently from MS Word: OpenOffice Writer does not insert a pair of angled brackets («...») around the displayed field text. You can hover your mouse cursor over the field to see the "real" value that will be used by Docmosis to lookup the data. Another easy way to access the "real" value is to right click on the field and select "Fields".

8. Click **OK**.
9. To close the *Input Fields* dialog box, click **Close**.



**Note**

When inserting fields in OpenOffice Writer you may choose to leave the field dialog open whilst you work and whenever you need to add a field, you simply go to the dialog and start adding it. Also, note that `ctrl-F2` is a shortcut to the Fields dialog.

## 2.4 Text Substitution

The simplest (and often most useful) fields in a Docmosis template are ones that look up data and place it into the document. Docmosis supports simple text substitution and also insertion based on more complex "expressions". The following sections provide details about these population fields.

### 2.4.1 Simple Data Lookup Fields

Docmosis supports the inclusion of elements that simply match an element of data that is output by the application (essentially, this is a one-to-one match). Wherever an element occurs, Docmosis will substitute the actual data value in the document. The inserted data inherits all the typesetting characteristics that are applied to the field such as font and paragraph style. The syntax for a text field is:

<<element-name>>

To populate the template element, the Docmosis engine would attempt to source data by the name of the element. A field designed to look up data for "firstName" would appear in different ways depending on how you create the field:



Field	Appearance
Plain Text Field	<<firstName>>
Word Merge Field	«firstName»
Writer Input Field	firstName

Docmosis will replace the field with all the text supplied as if you had selected and typed over the field by hand. If the lookup data contains new-line characters, Docmosis will create new paragraphs in the resulting document. If there is no lookup data for the name, the field is removed.

### 2.4.2 Expression Fields

Docmosis templates allow you to evaluate an *expression* to be inserted into to template. The expression syntax supports literals, data-lookups, operators and functions and return this as a result, instead of simply the piece of data. This is enabled by using the <<{ and }>> delimiters.

So, we could display a person's name for example using:

```
<<{firstname + ' ' +surname}>>
```

## 2.5 HTML Insertion

Docmosis supports the injection of HTML content. The following field:

```
<<html:myHtmlData>>
```

Will cause `myHtmlData` to be fetched from the data and injected as HTML. For example, if `myHtmlData` contained:

```
<h1>My Heading</h1>
```

Then the text "My Heading" will appear as Heading 1 in the output document. HTML can be arbitrarily complex and not all HTML will be rendered into a document as well as a browser can do. Typically using inline styles (rather than style declarations) will produce good results. The intention is to allow simple HTML "snippets" to be inserted via data where this is advantageous to the application using Docmosis.

## 2.6 Images

Docmosis is able to insert images at arbitrary locations in documents. Instead of using fields to identify the location for an image substitution, Docmosis uses the word processor's image handling features. By handling images this way, the template can precisely define how the image will be placed and bordered within the resulting document. As each word processor works slightly differently, there are specific methods for setting up the Docmosis code element:

- In MS Word Docmosis uses the bookmarks feature to identify a name for an image; and
- OpenOffice Writer supports the identification of images directly, using a *Name* property.



Docmosis Example Template

**Staff Profiles**


Please contact any of our friendly and experienced staff for more information about your system solution.

<rs\_IDSets>

Name: <name>  
 Position: <position>  
 Tel: <telephone>  
 Email: <email>

Summary:  
 <profileSummary>

<es\_IDSets>



In MS Word, bookmarks identify images.

Images can be placed anywhere in a Docmosis template.



**Note**

In the preceding example, a borderless table is used for layout purposes.



**Tip**

This activity doesn't discuss the actual images that you will publish, only the placeholder image. You may create and use your own image but for your convenience, a placeholder image is provided as part of the Docmosis distribution.

You are free to use it without restriction.



**Use only inline images in MS Word**

Docmosis cannot support floating images in MS Word because it uses the bookmarks feature to assign a name an image placeholder. When you position an image using the floating position settings, MS Word removes the bookmark. There are other limitations to how Docmosis supports images, particularly in terms of overlapping with text and other images. This generally will not cause issues for typical documents.

**Image file size**

When you insert a placeholder image, you will embed the image in the document. This means there is a copy of the image at every location in which it is placed (not simply a single, referenced copy). To limit the overall size of the template file and to improve the performance of a document generation, you should use relatively simple and small placeholder images to identify the locations without compromising on print-quality if the document is to be printed.

**Image placeholder naming convention**

Image placeholder names are identified using special prefixes. These prefixes are a useful way to distinguish those items that are specific to your Docmosis application and enable you to use the bookmarking and naming features for other items that aren't part of a document generation.

The prefixes you can use are:

Prefix	Example	Effect
--------	---------	--------

img_	img_image1	The image is substituted with the supplied <i>image1</i> and default scaling is applied. The default scaling is "stretch" and may be changed by Docmosis properties or by parameters when rendering the document.
imgstretch_	imgstretch_image1	The image is substituted with the supplied <i>image1</i> and stretch scaling is always applied. The image is stretched to be the same size and shape as the place holder image in the template.
imgfit_	imgfit_image1	The image is substituted with the supplied <i>image1</i> and the image will be scaled to fit the template placeholder whilst preserving image1's aspect ratio.



### Note

Docmosis previously used "bm\_" instead of "img\_". The "bm\_" prefix is still valid and is synonymous with "img\_" but its use is deprecated and future versions of Docmosis may remove support for it.

In the following procedures, an image is inserted as a place holder in the template to be substituted for image data identified by "image1".



### To insert an image element (MS Word):

1. Position the insertion point at the location of the image.
2. Select **Insert > Picture > From File**.
3. In the *Insert Picture* dialog box, navigate to the location of the placeholder image and select it in the list of files.
4. Click **Insert**.
5. When the image appears in the document, select it and use the reshaping handles to adjust the dimensions of the image.
6. Make sure that the image is selected and click **Insert > Bookmark**.
7. In the *Bookmark* dialog box, type `img_image1` into the **Bookmark name** field.
8. Click **Add**.



### Tip

MS Word wraps the content of the bookmark in light-coloured square brackets. To see the bookmark in place, set the **Bookmarks** option in the MS Word *Options* dialog box.



### Tip

MS Word Bookmarks names can't contain "\$" characters. To use a Docmosis variable in a bookmark name use "var\_" instead of "\$", for example "var\_myVar" instead of "\$myVar".



### Tip

MS Word Bookmarks names can't contain "." characters, so it cannot directly use "nested" lookups (eg `person[0].photo`). You can use Docmosis variables to overcome this in conjunction with the tip above about referencing variables in bookmarks.

eg `<<$myImage=person[0].photo>>` in your template body to set the variable



and "img\_var\_myImage" as the book mark name to link the image data to the template image.



### ***To insert an image element (OpenOffice Writer):***

1. Position the insertion point at the location of the image.
2. Select **Insert > Picture > From File**.
3. In the *Insert picture* dialog box, navigate to the location of the placeholder image and select it in the list of files.
4. Click **Open**.
5. When the image appears in the document, select it and use the reshaping handles to adjust the dimensions of the image.
6. Make sure that the image is selected and click **Format > Picture**.
7. In the *Picture* dialog box, select the **Options** tab.
8. Type `img_image1` into the **Name** field.
9. Click **OK**.

Both bookmark names and image names must be unique in your template since both Word and Writer force the name to be unique. If you wish to reference the same image in your template multiple times, you will have to provide different names by which the image can be referenced.

## **2.7 Barcodes**

Docmosis can generate barcodes and insert them into your output document. Barcode insertion is the same as image insertion except extra information is provided to specify the type of barcode, resolution etc.

### **2.7.1 Supported Barcode Formats**

The following barcode formats are supported:

- Code39
- Code128
- ITF14

### **2.7.2 Typical Example**

As a typical example, you would put a placeholder image into your template and mark it (with a name or bookmark as per section 2.6 above):



Image "marked" as "imgfit\_barcode1".

Your data can supply the barcode type and value (eg. in JSON format):

```
"barcode1": "1234567:code128"
```

Docmosis would then render a code 128 barcode with the value 1234567:



### 2.7.3 Using a Template "Barcode" Field to Provide Defaults

In the above example, the placeholder image determines the size, position and name for the bookmark. The rest of the information is provided by the data at render-time.

It is also possible to provide barcode information with a "barcode" field in the template. A barcode field starts with "barcode:".

Continuing the above example, the template could provide barcode information like this:

```
<<barcode:barcode1:code128>>
```


This indicates that barcode1 will be a code 128 barcode. The data provided at render-time could then simply provide the value (eg. in JSON format):

```
"barcode1": "1234567"
```





The barcode information field can appear anywhere in your template.

### 2.7.4 Common Examples

The following table shows common examples of use.

Docmosis Template (placeholder is marked as "barcode1")	Data (JSON format example)	Result
	"barcode1": "123355:code39"	<p>A code39 barcode with value 123355.</p> <p>The data provided the barcode type and value.</p>



Docmosis Template (placeholder is marked as "barcode1")	Data (JSON format example)	Result
 <<barcode:barcode1:code39>>	"barcode1": "123355"	A code39 barcode with value 123355.  The template specified the barcode type. The data provided the barcode value.
 <<barcode:barcode1:code39>>	"barcode1": "123355:code39:dpi=1200"	A code39 barcode with value 123355 and resolution 1200 dpi.  The data has specified all configuration.
 <<barcode:barcode1:code39:dpi=1200>>	"barcode1": "123355"	A code39 barcode with value 123355 and resolution 1200 dpi.  The template has specified the barcode type and resolution. The data has specified only the value.
 <<barcode:barcode1:123355:code128>>		A code128 barcode with value 123355.  The template has specified the barcode value, type and resolution. This means the barcode is valid without data and is always the same unless overridden by data.

## 2.7.5 Barcode Tips

When trying to work out the settings for the barcode, this is the recommended process:

1. Position the barcode placeholder image in the template using the size and orientation that works for your template – the bigger the better for reliable scanning.
2. Use "imgfit" to mark the placeholder image (eg imgfit\_barcode1) to preserve the aspect ratio of the generated barcode. You can use the "imgstretch" to force the barcode to match your placeholder precisely but this will likely reduce the accuracy of the barcode and may make it harder to scan. By all means do, but test it well.
3. You can make the barcodes very small at a high resolution but realise this may impact the ability to be scanned
4. Let Docmosis apply the default settings first and see if that produces a good result. If not then start experimenting. The height, module width and wide factor are settings that change the width of the resulting barcode.



- 5. The DPI setting typically should be 200 or higher. If you generate a barcode at below 100 dpi the quality is typically too low to scan. The default is 600.

### 2.7.6 Barcode Controls in Detail

Anything about a barcode can be specified in the template with a barcode field, including the value:

```
<<barcode:barcode1:111222333:code128>>
```

and other configuration can be appended. For example:

```
<<barcode:barcode1:111222333:code128:dpi=1200:orientation=90>>
```

As mentioned previously, any template-settings can be overridden by the data supplied on a per-render basis. For example, the DPI resolution can be changed dynamically by the data (eg. in JSON format):

```
"barcode1": "1234567:dpi=800"
```

The data provided at render-time will override any value specified in a barcode field, meaning the data has the final say.

The following settings are common to the supported barcodes.

Common Settings				
Name	Shorthand	Description	Example	Default Value
moduleWidth	mw	Barcode module width as a double value. This defines the width of the narrow bars of the barcode. Typical values are in the range 1.0 - 3.0	mw=2.2	0.19 1.10 for ITF14
doQuietZone	dqz	Whether or not the quiet zone will be displayed around the barcode	dqz=true	False2
quietZoneWidth	qzw	The width of the quiet zone in mm.	qzw=2.0	12.0 for ITF14
quietZoneHeight	qzh	The height of the quiet zone in mm.	qzh=2.0	
height	h	The height of the barcode in mm. Depending on the type of barcode, the barcode value, the module width and other settings, the height influences also the width of the resulting barcode.	h=30.0	10.0 40.0 for ITF14
orientation	o	The orientation of the barcode in degrees, 0 is horizontal. Values allowed are 0, 90, -90, 180, -180, 270, -270.	o=90	0



Common Settings				
Name	Shorthand	Description	Example	Default Value
fontSize	fs	The size of the font for the displayed barcode value. Zero will remove the display of the value.	fs=0	
dpi	dpi	The number of dots per inch (resolution) of the barcode. The higher the resolution the bigger the resulting document and processing time. Typically you would use the minimum that suits the use of the barcode (eg taking into account the printer quality).	dpi=1200	600

Code 39 Specific Settings				
Name	Shorthand	Description	Example	Default Value
wideFactor	wf	Barcode wide factor as a double value. This defines the factor that wide bars are wider than narrow bars. Typical values are in the range 1.0 - 3.0	wf=2.0	2.2
extendedCharset	ec	Whether or not to allow an extended (ASCII-7 bit) character set to be used.	ec=false	true
displayChecksum	dc	Whether or not a checksum should be displayed in the human-readable part of the barcode.	dc=true	false
checksumMode	cm	The code 39 checksum mode: add, auto, check or ignore	cm=add	
displayStartStop	dss	Whether or not to display the start and stop characters in the human-readable part of the barcode.	dss=false	
intercharGapWidth	icgw	The width between encoded characters in the barcode (mm).	icgw=0.2	

Code 128 Specific Settings				
Name	Shorthand	Description	Example	Default Value
none				



ITF 14 Specific Settings				
Name	Shorthand	Description	Example	Default Value
wideFactor	wf	Barcode wide factor as a double value. This defines the factor that wide bars are wider than narrow bars. Typical values are in the range 1.0 - 3.0	wf=2.0	2.5
bearerBarWidth	bbw	The width of the bearer bar in mm.	bbw=2.0	1.0
displayChecksum	dc	Whether or not a checksum should be displayed in the human-readable part of the barcode.	dc=true	false
checksumMode	cm	The code 39 checksum mode: add, auto, check or ignore	cm=add	

## 2.8 Active Hyperlinks

Docmosis allows you to insert a hyperlink dynamically into your document. In your template, a particular naming convention identifies fields you would like to work as hyperlinks.

To create a hyperlink, insert a field starting with "link:" (or "link\_"). For example, the following field:

```
<<link:myWebSpace>>
```

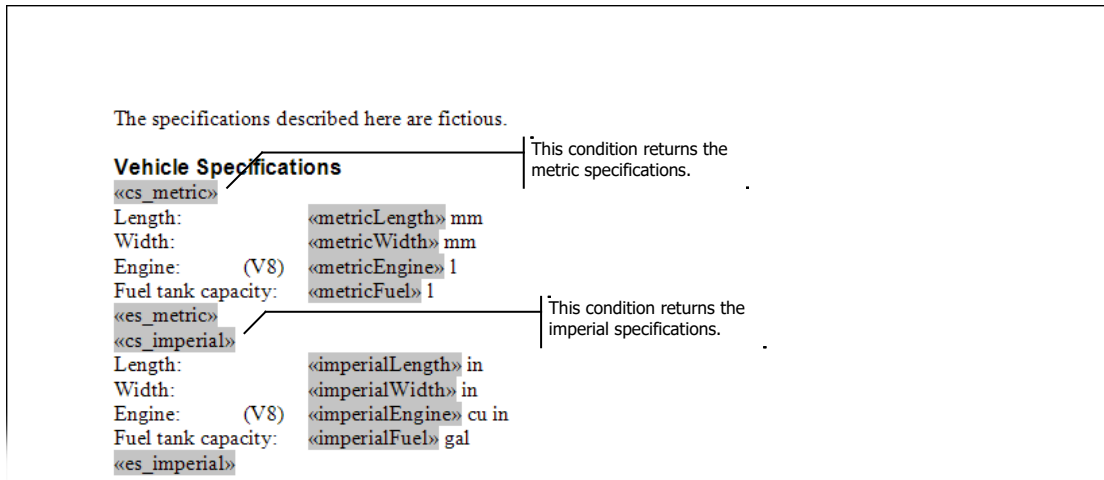
will act as a hyperlink looking up data for `myWebSpace` in your data. If your data has a value `http://www.docmosis.com` for `myWebSpace`, then a hyperlink to `http://www.docmosis.com` will appear in your rendered document.

You may also wish to make the displayed text for your hyperlink different from the actual URL of the link. Using the above example, to display *DOCMOSIS* instead of *http://www.docmosis.com* for the link in the final document, the data can provide a value `DOCMOSIS|http://www.docmosis.com`. The pipe (|) symbol separates the display name from the actual link.

## 2.9 Conditional sections

Conditional content is content in that will be populated in the final document depending upon the data that is generated by the application. If the specified condition is met, the content within the matching conditional section is rendered in the document.

An example of the application of conditional content might be in a product description such as that for a motor vehicle in the following illustration.



An example of conditional sections in a Docmosis template.

The conditional sections will render the data that is appropriate for each condition. That is, each document will be generated with either metric or imperial specifications but not both. Each conditional section is defined using a pair of fields: a start field and an end field. The general syntax for a conditional section is:

```
<<cs_condition-name>>
```

The text and elements of the conditional section.

```
<<es_condition-name>> or simply <<es_ >>
```

Conditional sections can use expressions, variables and range specifiers. See the tables in 1.5.3 Docmosis elements for more information.

The conditional start and end tags are removed from the resulting document and if each tag is on a line by itself, the entire line will be removed.

#### ***To create a conditional section:***

1. Position the insertion point in an empty paragraph at the starting location of the conditional section.
2. Insert the opening condition element into the empty paragraph.
3. Add the boilerplate content and other Docmosis elements into the subsequent paragraphs in the document.
4. Insert the closing condition element into an empty paragraph following the conditional content.
5. Repeat steps 1 through 4 for as many conditions as there are in your application.

## 2.10 Repeating sections

In a document, a repeating section is a group of elements in succession whose content changes but whose format is the same. Docmosis supports several forms of repeating sections: block-level, tables and lists.

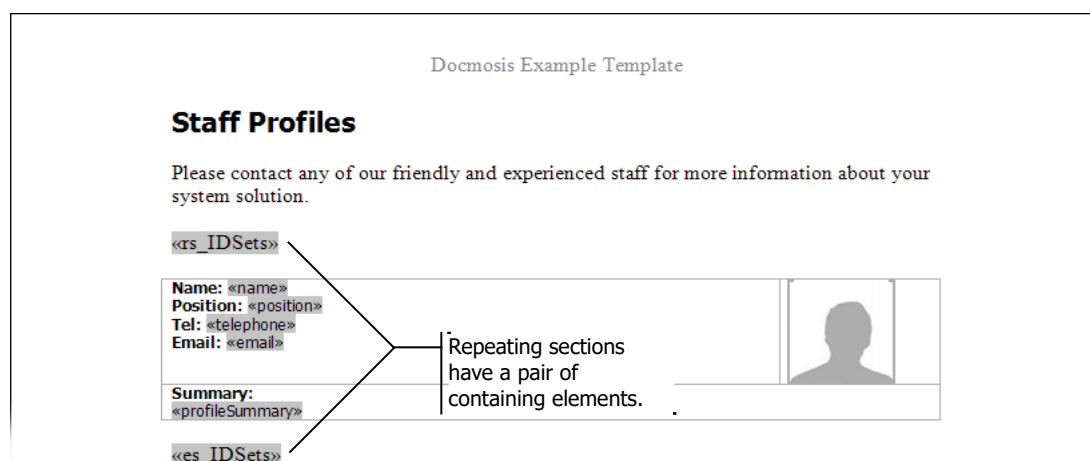


### Note

Tables and lists are special forms of repeating sections. They are discussed after this section that deals specifically with block-level repeating sections.

There might be occasions when you want to include repeating sections but do not want to use tables and lists (bulleted or numbered) to present them. In this case you use the Docmosis repeating section elements. Repeating sections can contain any content desired, and it will be repeated whilst there is data to be displayed.

The example below shows a repeating section named `IDSets`, and it contains a table with an image and textual data. This table will be repeated as many times as there is data associated with `IDSets`.



Repeating sections also contain boilerplate content and other Docmosis elements.

The general syntax for a repeating section is:

```
<<rs_repeating-section-name>>
```

The text and elements of the repeating section.

```
<<es_repeating-section-name>> or simply <<es_ >>
```

Repeating sections can be “nested” inside other repeating sections to any depth desired. Repeating sections can use variables and range specifiers as appropriate. See the tables in 1.5.3 Docmosis elements for more information.

The repeating start and end tags are removed from the resulting document and if each tag is on a line by itself, the entire line will be removed.



### ***To create a repeating section:***

1. Position the insertion point in an empty paragraph at the starting location of the repeating section.
2. Insert the opening repeating section element into the empty paragraph.
3. Add the boilerplate content and other Docmosis elements into the subsequent paragraphs in the document.
4. Insert the closing element into an empty paragraph following the repeated content.

Repeating sections also provide access to some built-in variables such as `$$idx` which is the current count of the number of times the loop has been repeated starting from zero. For, given 4 "people" in an array `$$idx` can be used as a index as follows:

```
<<rs_people>>  
<<$$idx>>. <<$$name>>  
<<es_people>>
```

To produce output that might look like this:

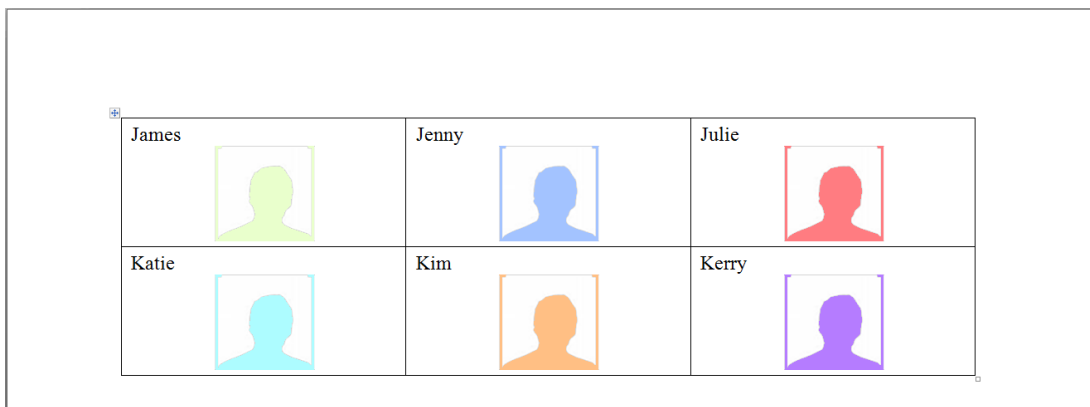
0. James
1. Jenny
2. Julie

whereas using `$$itemnum` instead would result in:

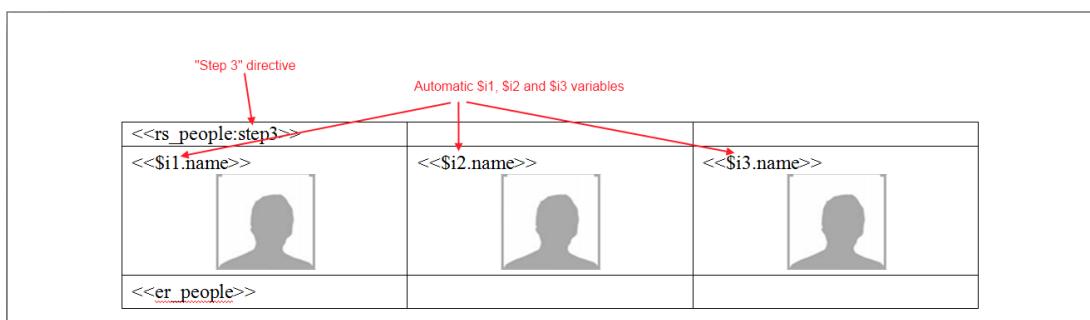
1. James
2. Jenny
3. Julie

## **2.10.1 "Stepping Across" in Repeating Sections**

Docmosis supports the concept of repeating in "steps". Say for example you have a simple array of people objects in your data, and you need to place this on the page in a 3-across layout:



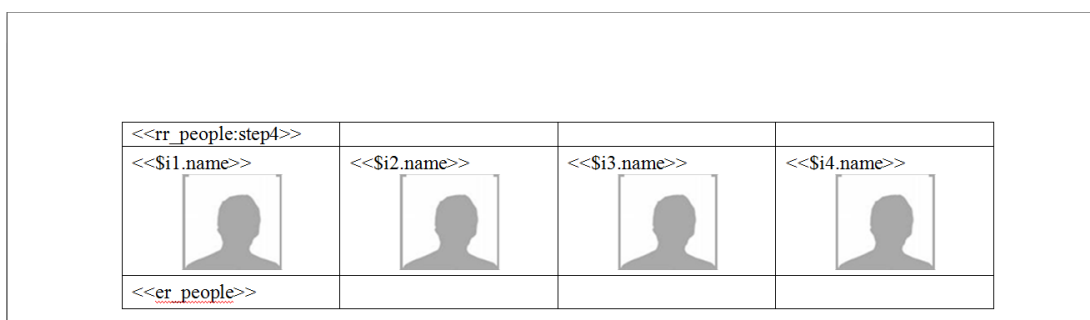
the "stepping" allows you to do this in the template as follows:



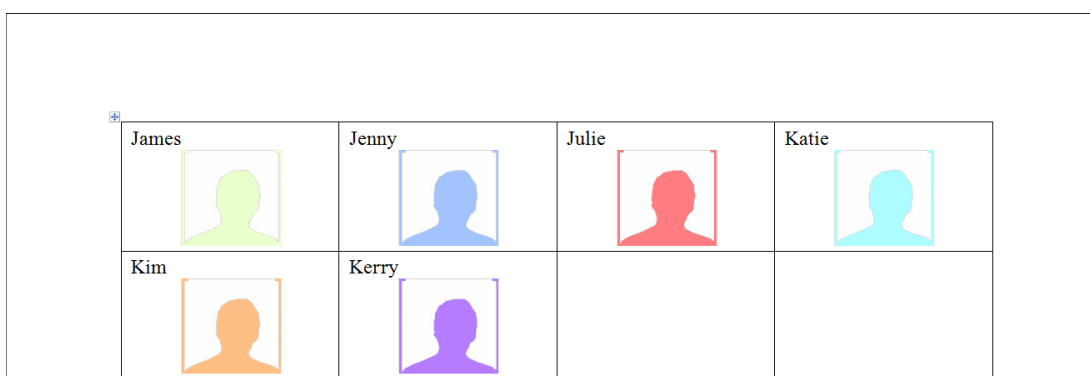
The ":step3" directive tells Docmosis that we want to move through the "people" data in steps of 3. Docmosis automatically creates the \$i1, \$i2 and \$i3 variables for you to use corresponding to the first, second and third elements. For the second row, \$i1, \$i2 and \$i3 will correspond to the fourth, fifth and sixth elements and so on.

Docmosis will automatically create the variables required corresponding to the step being used. In the case of "step10", variables \$i1, \$i2,... \$i10 will exist.

If you need a 4-across layout instead, this is easily changed in the template by using ":step4" and adding the 4th column in your template to layout as you require:



and the resulting document (using the same data) would look as follows:



The \$i1, \$i2 etc. automatic variables correspond to the elements in the data provided under the "people" key. The example above assumes that each object in the "people" data has at least a "name" attribute and an image to display. Though you can't see it from the example, each of the images also has a template-setting to indicate where the images come from. In Word templates, this would be a bookmark and in OpenOffice Writer, this would be the image name (see section 2.6 Images for more information about inserting images).





### Note

The examples here use the repeating rows (<<rr\_>>) directive, but the stepping directives also apply to repeating sections (<<rs\_>>).

Docmosis also creates \$idx1, \$idx2... and \$itemnum1, \$itemnum2... variables which relate to the \$i1, \$i2... variables. The \$idx1, \$idx2.. variables provide the absolute index into the data starting at zero (ie 0,1,2,3,4,5...). The \$itemnum1, \$itemnum2... variables provide the absolute index starting at one (ie 1,2,3,4,5,6...).

## 2.10.2 "Stepping Down" in Repeating Sections

In the same way Docmosis can present your data in groups of 2, 3, 4 etc across a page, it can also create groups of 2, 3, 4 etc but moving down the page instead. This means that Docmosis will populate down column1, then down column 2, column3 and finally column 4. Docmosis will automatically balance the data into the right number of rows.

Given the above example where we have four columns, but we wish to show the data down the columns rather than across the template and the result would look as follows. Notice in the template the "step4down" directive:

<<rr_people:step4down>>			
<<\$i1.name>>	<<\$i2.name>>	<<\$i3.name>>	<<\$i4.name>>
<<er_people>>			

And in the resulting document, notice that James is followed by Jenny underneath. The next element (Julie) is displayed at the top of column 2 and so on:

James 	Julie 	Kim 	Kerry 
Jenny 	Katie 		

The "step" functions allow the template to control more of the presentation options given the same set of data. Note that although the examples above are shown in tables since that is often a good way to present the data, the same concepts apply to repeating sections.

## 2.11 Tables

Using fairly simple table markup, you can create sophisticated table layouts in your output documents. In addition to being able to insert text and images using the methods already described, you can use the table-specific Docmosis elements to control:

- including or excluding of groups of rows;
- repeating groups of rows;
- removing columns.

### 2.11.1 Conditional rows

A set of consecutive rows can be removed from a table using conditional row elements. The following example uses the `<<cr_hasFriends>>` and `<<er_hasFriends>>` elements to indicate a group of rows in a table that should be excluded if there are no friends.

Docmosis Example Template

Circle of Friends	
<code>&lt;&lt;cr_hasFriends&gt;&gt;</code>	
Jimmy has some friends	
<code>&lt;&lt;er_hasFriends&gt;&gt;</code>	

In this case, if the data indicates that `hasFriends` is true then the row containing "Jimmy has some friends" would be left in the resulting document, otherwise it would be removed. In all cases, the rows containing the markers `<<cr_hasFriends>>` and `<<er_hasFriends>>` will be removed:

Docmosis Example Template

Circle of Friends	
Jimmy has some friends	



**Note**

End markers for conditional rows can also be defined without the name. In the above example, the field <<er\_hasFriends>> could also be simplified to <<er\_ >>.

### 2.11.2 Repeating rows

Rows of a table can be repeated whilst there is data to repeat. The following example will list of all the friends of Jimmy using one row for each friend showing their name in one column and job in another.

The following example uses the <<rr\_friends>> and <<er\_friends>> elements to indicate a group of rows in a table that should be excluded if there are no friends.

Docmosis Example Template

Circle of Friends	
Friend	Job
«rr_friends»	
Jimmy has a friend called «friend»	«friendJob»
«er_friends»	

In this case, while the data can supply information for friends the row containing the lookup friend information will be rendered. In all cases, the rows containing the markers <<rr\_friends>> and <<er\_friends>> will be removed.

Docmosis Example Template

Circle of Friends	
Friend	Job
Jimmy has a friend called Dave	Marketing Manager
Jimmy has a friend called Dee	C++ Developer
Jimmy has a friend called Pete	Roof Tiler

### 2.11.3 Alternating Row Colours and Border Controls

The template for repeating rows also provides some tricks for colouring and borders that can produce impressive results. The rules are as follows:

1. if a cell of a row inside a set of repeating rows has a background colour different to that of the corresponding cell of the starting row (the row with the `<<rr_XXX>>` element), then the background colour for that cell will alternate between that of the starter row and it's own background colour. This allows everything from plain tables, to alternating rows to crazy alternating patterns.
2. the starting row (the row with the `<<rr_XXX>>` element) determines the top border of the first repeating row. The ending row (the row with the `<<er_XXX>>` element) determines the bottom border of the last row to be rendered. This applies on a cell-by-cell basis as for the background colouring. This allows for highly configurable borders to be specified that work pretty much as one would expect.

The following example creates a bounding border encapsulating all the repeating rows (including the marker rows, and alternates the background colour.

Docmosis Example Template

Circle of Friends	
Friend	Job
<code>&lt;&lt;rr_friends&gt;&gt;</code>	
Jimmy has a friend called <code>&lt;&lt;friend&gt;&gt;</code>	<code>&lt;&lt;friendJob&gt;&gt;</code>
<code>&lt;&lt;er_friends&gt;&gt;</code>	

Notice in the result below the alternating background colours and the border wraps all cells collectively.

Docmosis Example Template

Circle of Friends	
Friend	Job
Jimmy has a friend called Dave	Marketing Manager
Jimmy has a friend called Dee	C++ Developer
Jimmy has a friend called Pete	Roof Tiler



**Note**

End markers for repeating rows can also be defined without the name. In the above example, the field `<<er_friends>>` could also be simplified to `<<er_ >>`.

More advanced examples are given in section 2.11.6.

## 2.11.4 Disabling Row Alternating

Sometimes alternating row colouring is not desirable. In this case, Docmosis templates can disable the row colouring by using the `<<noTableRowAlternate>>` directive. The following rules apply the scope of effect of the directive:

1. if `<<noTableRowAlternate>>` appears anywhere in a table, the alternating colouring is disabled for that table.
2. If `<<noTableRowAlternate>>` appears in the body text of the template (outside of any table) all following tables will have no alternating colouring.

## 2.11.5 Conditional columns

A template may also indicate columns in a table that are to be conditionally removed. The width of the table remains as fixed in the template and the space recovered by the removal of the column is spread across the remaining columns. The following example shows a Docmosis conditional column element (`<<cc_showJobs>>`) at the top of the second column.

Docmosis Example Template

Circle of Friends	<code>&lt;&lt;cc_showJobs&gt;&gt;</code>	
Friend	Job	Contact
<code>&lt;&lt;rr_friends&gt;&gt;</code>		
Jimmy has a friend called <code>&lt;&lt;friend&gt;&gt;</code>	<code>&lt;&lt;friendJob&gt;&gt;</code>	<code>&lt;&lt;friendContact&gt;&gt;</code>
<code>&lt;&lt;er_friends&gt;&gt;</code>		

When rendered, this removes the column entirely where the data indicates that `showJobs` is false.



Docmosis Example Template

Circle of Friends	
Friend	Contact
Jimmy has a friend called Dave	After hours
Jimmy has a friend called Dee	Any time
Jimmy has a friend called Pete	Any time

The following example uses *expressions* to conditionally remove two columns from the table. If you examine the Trial 2 and Trial 3 columns, you will see the conditional column expressions in fields <<cc\_{ntrials>1}>> and <<cc\_{ntrials>2}>>.

Lab Results	Trial 1	Trial 2 «cc_{ntrials>1}»	Trial 3 «cc_{ntrials>2}»	All Passed
«r_specimens»				
«name»	«results1»	«results2»	«results3»	«passed»
«er_»				

If the underlying data says there is only one trial for example, that is, ntrials = 1 then the conditions for the Trial 2 and Trial 3 columns will evaluate to false and the columns will be excluded. This is shown in the following example output:

Lab Results	Trial 1	All Passed
SP1A-2474	47.241	No
SP1A-2524	23.442	Yes
SP1A-3211	13.672	No
SP1A-3213	53.342	No

If the underlying data says there are 2 trials, that is, ntrials = 2, then the Trial 2 column will remain in the resulting document, but the Trial 3 column is still removed:

Lab Results	Trial 1	Trial 2	All Passed
SP1A-2474	47.241	32.553	No
SP1A-2524	23.442	44.123	Yes
SP1A-3211	13.672	61.153	No
SP1A-3213	53.342	12.223	No



## 2.11.6 Advanced table structures

Docmosis supports the nesting of repeating and conditional content in table structures. The following example template shows multiple levels of repeating to print out the room details within each floor within each hotel.

<b>&lt;&lt;tr_hotels&gt;&gt;</b>		
<b>Hotel &lt;&lt;hotel&gt;&gt;</b>	Location <<location>>	
<<tr_floors>>		
Floor <<floor>>		
<b>Room #</b>	<b># Beds</b>	<b>Other Features</b>
<<tr_rooms>>		
<<roomNo>>	<<nBeds>>	• <<roomFeature>>
<<tr_rooms>>		
<<tr_floorRow>>		
<b>&lt;&lt;tr_hotelRow&gt;&gt;</b>		
Footer		

The example above is fairly extreme and it would often be more natural to represent the structure in a combination of repeating sections and tables with repeating rows. The following template is equivalent but is not providing the entire structure within a single table:

```
<<rs_hotels>>
Hotel <<hotel>> in <<location>>
<<rs_floors>>
Floor <<floor>>


| Room #       | # Beds    | Other Features    |
|--------------|-----------|-------------------|
| <<tr_rooms>> |           |                   |
| <<roomNo>>   | <<nBeds>> | • <<roomFeature>> |
| <<tr_rooms>> |           |                   |


<<rs_floors>>
<<rs_hotels>>
```

## 2.12 Lists

Docmosis infers repetition when there are one or more elements in paragraphs formatted as a list using the 'bullets and numbering' features. As long as the data provider has data to populate, the list will be rendered with items.

In the following example, a field is formatted as a numbered list and will be automatically expanded.

Docmosis Example Template

**List Expansion Example**

These are my friends:

1. «friends[\*].friend»

*An example of a list item.*

Docmosis splits the element into two parts, a repeating component and a lookup component. The repeating component can be limited by a using range specifier covering multiple values. In this example, the range specifier [\*] against the friends name means for all friends and the trailing friend name is the lookup of the data to display.

Docmosis Example Template

**List Expansion Example**

These are my friends:

1. Dave
2. Dee
3. Pete

As another example of how the field is split, consider the following template.

Docmosis Example Template

**List Expansion Example**

My first friend «friends[F].friend» has the following pets:

- «friends[F].pets[\*].type»





The element now is in a bullet list style rather than numbered. It has a repeating component `friends[F].pets[*]` meaning all pets of the first friend and a lookup component type. The resulting document is shown below where the friend has a dog and a parrot.



Docmosis only allows a single component of the element to be a multi-valued range. For example, Docmosis would not allow an element `friends[F2].pets[*]` since this would repeat at multiple stages and typically would be a mistake.

***To create a list:***

1. Position the insertion point at the location of the first list item.
2. Format the paragraph as a list item (bulleted or numbered).
3. Add the Docmosis element that will render the data into the list paragraph.

## 2.13 Merging Templates Together

Docmosis has the ability to combine multiple templates into the resulting document. This gives developers and template authors the ability to separate common content out of individual templates and into a "shared" or common template. The common information then only needs to be maintained in one location and all referencing templates will automatically use the new information. Examples of use include company information including logos for the header, contractual clauses and signature blocks for the body, or even the specific content of the bottom left of the footers.

Templates used for inclusion can include all typical content including styled text, headings, tables, images etc. Docmosis will populate the templates as per normal using the data that applies at the point of insertion, as if it were content in the main template as opposed to separated out. Any number of templates can be included, and included templates may include other templates.

The way to control this is to insert a *reference* in your template to another template. The referenced template will be populated and inserted at the referenced location. For example, given a starting template `MainProcess.doc` that references two other templates `process1.doc` and `process2.doc`, Docmosis will insert `process1.doc` and `process2.doc` into `MainProcess.doc` as it processes `MainProcess.doc`.

Docmosis supports two ways of referencing templates; directly and indirectly. Each of these is explained in the following sections.



### 2.13.1 Direct Referencing

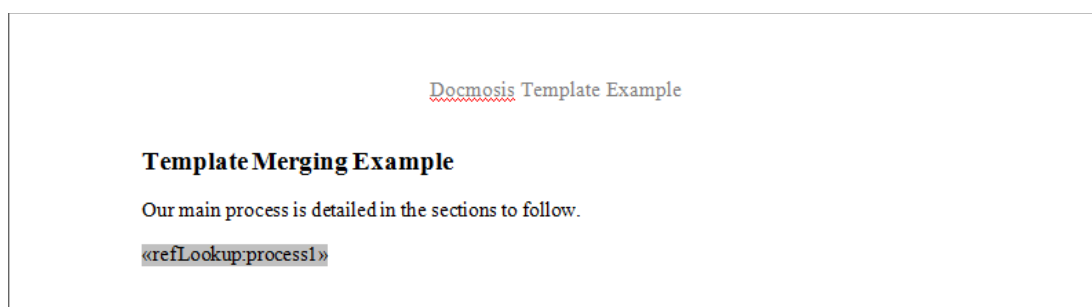
Direct referencing is very simple, the template to include is literally named in the reference. The way to create a direct reference is to use a merge field prefixed with "ref:". For example `<<ref:process1.doc>>` will cause the template `process1.doc` to be inserted. The following example shows how this would look in a template:



### 2.13.2 Indirect Referencing

The name of the template to include can be determined by the data, rather than by the template directly. In this scenario, Docmosis will ask the DataProvider to provide the template name.

To create an indirect reference, the field prefix "refLookup:" is used. For example, if we created a field `<<refLookup:process1>>`, Docmosis will ask the DataProvider for the name of the template under the key "process1". The value the DataProvider returns will be used as the name of the template to insert into the document. If the template in the example above was changed to use an indirect reference as discussed, it would look like this:



### 2.13.3 Templates in Different Locations

Docmosis assumes by default the templates referenced existing in the same location (that is the same template context) as the referring template. In our scenario above, `process1.doc` and `process2.doc` must exist in the same place as `MainProcess.doc`. This works for small scale use, but would quickly become unmanageable if there were a large number of templates in use.

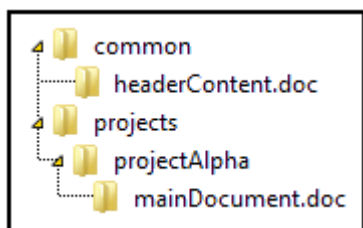


For example, say the company banner information has been put into a separate template for use in all documents, it would be unfortunate to have copies of this template everywhere. Instead, there might be a single copy of the template in a common area for all projects and templates to reference. Docmosis allows the templates to be referenced in any context using the familiar path notation. Here are some example template references and what they mean.

Field	Description
<code>&lt;&lt;ref:template1.doc&gt;&gt;</code>	template1.doc is expected to be in the same location as the calling template.
<code>&lt;&lt;ref:/template1.doc&gt;&gt;</code>	template1.doc is expected to be in "root" context . The root context is the parent of all other contexts.
<code>&lt;&lt;ref:/common/template1.doc&gt;&gt;</code>	template1.doc is expected to be in the "common" context one down from the root context
<code>&lt;&lt;ref:../template1.doc&gt;&gt;</code>	template1.doc is expected to be in the parent context of the calling template.

For example, consider a project "projectAlpha" which has its own templates and is stored in the template context "projects/projectAlpha". We want to include a common heading in some of our templates, and so we separate that content into a separate template called corporateHeading.doc. We realise that corporateHeading.doc applies to lots of other projects and should not really exist inside projectAlpha itself.

We decide to create a common area to store the templates that are common to lots of projects inside the context "common". When all our templates are loaded into Docmosis, the template store will look like this:



Templates such as mainDocument.doc will be able to reference and include the template headerContent.doc using the field `<<ref:/common/headerContent.doc>>` or the field `<<ref:../../common/headerContent.doc>>`. The two fields just listed use a literal "ref:" lookup of the template names; the same result can be achieved using the indirect "refLookup:" lookup if the data provider supplies the appropriate value.



**Note**

If you are using Word for your templates, make sure the paths or folders you are using don't contain spaces in the name. If so, the fields in the Word template will not work as desired (and Docmosis will tell you so). If you really wish to have spaces in the names of paths and folders, then you will have to use dynamic (refLookup:) fields rather than static (ref:) fields or use OpenOffice Writer for your templates.

## 2.13.4 When A Template Cannot Be Found

Docmosis treats a missing template as an error. During the rendering of a document, if a template reference is encountered and the template cannot be found then an error will be raised. Depending on Docmosis configuration this will either write the error into the resulting document, or produce no document at all and raise a Java Exception (see section 1.5.3.11 Error Handling).



### Note

Variables can also be referenced using `var_` instead of `$`. This means `<<$name>>` is equivalent to `<<var_name>>`. This is particularly useful for bookmarking images using variables in MS Word, where you cannot use the `$` symbol in the bookmark name.

A template *could* make reference to a template that doesn't exist and still be functional if the processing of that template does not try to render the missing reference. This could happen if the reference was in a conditional section that always gets skipped, for example.

## 2.13.5 Limitations

There are some practical limitations to the ability to include templates. The following sections cover the fundamental limitations.

### 2.13.5.1 Headers and Footers

The main (root) template defines the headers and footers that will be used throughout the produced document. Any headers and footers in the included templates will be ignored. This doesn't mean the *content* of headers and footers can't be determined by included templates, but the presence and overall properties are controlled by the main template.

### 2.13.5.2 Performance

The flexibility and maintainability provided by the Docmosis template merging feature has a small processing overhead at runtime. Since significantly more work needs to be done to produce the final combined document it is not surprising that there is a runtime cost. The impact will vary upon the numbers and sizes of included documents but in practice the difference in practice is not expected to be noticeable.

### 2.13.5.3 Styling Limitations

There are some tricks to learn about styling with regards to including templates. One example is where the included template has a Heading style for the first line. Depending on the versions of OpenOffice in use, the Heading style may get dropped unless there is a leading blank line first. This is fairly minor in practice, but something to be aware of. Most of the time the behaviour will be as expected and so experimentation will only occasionally be called-for.



## 2.14 Page and Other Breaks

Docmosis templates may contain several types of break including page breaks, column breaks and section breaks. If the break is in your template it will appear in your rendered documents unless you condition it out with a conditional section. If the break is inside a repeating section it will be repeated each time your repeating section is displayed.

To allow templates to be more expressive, Docmosis provides several fields that can be used to render a break, but without having to place the break literally into the template:

Field	Description
<<pageBreak>>	Insert a page break at this location in the document.
<<columnBreak>>	Insert a column break at this location in the document. This only applies to templates that have a multi-column page layout.
<<pageBreakNotLast>>	Insert a page break at this location in the document unless we have finished repeating the current repeating section. This is only valid within a repeating section.
<<columnBreakNotLast>>	Insert a column break at this location in the document unless we have finished repeating the current repeating section. This is only valid within a repeating section and within a page layout that is multi-column.

For example, a template section repeating person details and desiring to put each person on a separate page could look like this:

```
Docmosis Example Template

«ts_people»
First Name: «firstName»
Last Name: «surname»
«pageBreakNotLast»
«es_people»
```



## 3 Applying a Renderer

To enhance the presentation of your documents, you can apply a “renderer” to a field.

This allows changes to be made to the display of the data including changing the:

- background colour (if in a table cell);
- font style to bold, italics or underline.
- characters/text to be displayed

Docmosis includes some Built-in Renderers for formatting: Booleans, Numbers and Dates. With Docmosis-Java you can also define your own custom renderers.



### Important

Later versions of Docmosis now provide a simplified method of formatting Numbers and Dates by using functions (see 1.5.3.7).

It is recommended to use the new functions where appropriate.

To associate a renderer with a field, you use the `renderer` qualifier to specify the name of the renderer that is to be used. The Java code supplying the data is also responsible for supplying any custom renderers (which is described in the *Docmosis Developer's Reference*). The only requirement in the template is to associate the renderer with the applicable field.

For example a custom renderer called “myrenderer” applied to the “surname” field would look something like this:

```
<<surname{renderer=myrenderer}>>
```



### Note

Remember, you don't need to use a `renderer` if you want a cell to be permanently shaded. Just applying shading to the cell in the template. Renderers are used to allow changes based on data/conditions that exist during document generation.



### Tip

You can set the background colour of a cell with no data by using an element whose name has no equivalent (and thus no data) in the application, or by using a field named `dummy`.



### Important

Make sure there are no spaces in the field name or qualifier. Spaces may cause the qualifier to not be recognised, particularly if using Word for the template source. If a space is required, use the underscore character (`_`).



### 3.1.1 Renderer Parameters

Parameters may be passed to renderers so that the same renderer can produce different results. For example, the following fields pass different parameters to the renderer named `myrenderer`:

```
<<surname{renderer=myrenderer('strict')}>>
```

```
<<surname{renderer=myrenderer('bold','relaxed')}>>
```

The first sends a "strict" parameter to `myrenderer`, whilst the second sends "bold" and "relaxed". `myrenderer` is written in Java code and may respond to these parameters as it sees fit.

### 3.1.2 Built-In Date Renderer

Docmosis has a built-in date renderer which is available to all templates without requiring any Java code.



---

#### Important

Date Formatting can also be achieved by using the built-in function "dateFormat" (see 1.5.3.7). It is recommended to use the new function where possible.

---

To use the date renderer simply reference a renderer named "date".

The synopsis for the date renderer is:

```
date([<output format> [,<input format>]])
```

where:

`output format` = the desired output format

`input format` = the format used to decode the input date

Both the date renderer and the new `dateFormat` function accept input and output format strings:

- If no "output format" is specified then the output date will be formatted in the default output format ('dd MMM yyyy').
- If no "input format" is specified then input date will be compared to a set of common input formats. If the input date cannot be decoded then an error will be flagged.



#### Note

Docmosis errors and footnotes are only injected in to documents when Docmosis is running in DEV mode.



The date formatter applies to date-typed data as comes from Java objects or database queries. If the data comes from textual data (such as raw strings, XML or JSON data) then Docmosis will automatically try to parse the data into a date. If you are passing an unusual formatted date via text, then you can tell the date renderer how to parse it by providing an "input format" parameter.

For example:

```
Birth Year=<<birthdate{renderer=date('yy','yyyy')}>>
```

Would accept birthdate data supplied as a 4-digit date only (eg: "1970") and produce a 2-digit date (eg: "70").

To allow for formats that include a space, the underscore character ( \_ ) is transcribed automatically into a space. This is done since fields cannot contain spaces when using Word as the template source. To include an underscore, the backslash character can be used to indicate that the underscore should be left as an underscore ( \\_ ).

**Examples** - if the data for "myDate" was "27 May 2009", the following table shows what different formats would produce:

Example Field	Result
<<myDate>>	27-MAY-2009
<<myDate{renderer=date}>>	27 May 2009
<<myDate{renderer=date('dd/MM/yyyy')}>>	27/05/2009
<<myDate{renderer=date('MMM dd, yyyy')}>>	May 27, 2009
<<myDate{renderer=date('EE, dd MMM yyyy')}>>	Wed, 27 May 2009
<<myDate{renderer=date('yyyy')}>>	2009

The same results can be achieved by using the dateFormat function:

Example Field	Result
<<myDate>>	27-MAY-2009
<<{dateFormat(myDate)}>>	27 May 2009
<<{dateFormat(myDate,'dd/MM/yyyy')}>>	27/05/2009
<<{dateFormat(myDate,'MMM dd, yyyy')}>>	May 27, 2009
<<{dateFormat(myDate,'EE, dd MMM yyyy')}>>	Wed, 27 May 2009
<<{dateFormat(myDate,'yyyy')}>>	2009





The input and output format strings can be created by using combinations of the following Letters:

Letter	Date or Time Component	Presentation	Examples
G	Era designator	Text	AD
y	Year	Year	1996; 96
M	Month in year	Month	July; Jul; 07
w	Week in year	Number	27
W	Week in month	Number	2
D	Day in year	Number	189
d	Day in month	Number	10
F	Day of week in month	Number	2
E	Day in week	Text	Tuesday; Tue
a	Am/pm marker	Text	PM
H	Hour in day (0-23)	Number	0
k	Hour in day (1-24)	Number	24
K	Hour in am/pm (0-11)	Number	0
h	Hour in am/pm (1-12)	Number	12
m	Minute in hour	Number	30
s	Second in minute	Number	55
S	Millisecond	Number	978
z	Time zone	General time zone	Pacific Standard Time; PST; GMT-08:00
Z	Time zone	RFC 822 time zone	-0800

The table above comes directly from Java's SimpleDateFormat class documentation, which is described in the Java API Specification. Some examples of suitable formats are shown above, however the full documentation for SimpleDateFormat can be read on-line at <http://www.oracle.com/technetwork/java/api> and navigating into the J2SE version of your choice.

### 3.1.3 Built-In Boolean Renderer

Docmosis can format boolean (true/false) data into several presentational styles using the built-in "boolean" renderer. This renderer exists since true/false can often be better displayed in a document by Yes/No, Y/N, tick/cross etc.

The built-in Boolean render takes a single parameter indicating the way the true and false values should be displayed. The following table lists the built in values that may be passed as a parameter.

Parameter	Effect
No parameter	true is rendered as "true" and false as "false"
"yn"	true is rendered as "Y" and false as "N"
"ynlc"	true is rendered as "y" and false as "n" (lower case)
"yesnouc"	true is rendered as "YES" and false as "NO" (upper case)
"yesnolc"	true is rendered as "yes" and false as "no"



"yesno"	true is rendered as "Yes" and false as "No" (mixed case)
"wingdings1"	true is rendered as a wingdings tick and false as a cross
"wingdings2"	true is rendered as a wingdings checkbox ticked and false as unticked
"dingbats1"	true is rendered as a dingbats light tick and false as a light cross
"dingbats2"	true is rendered as a dingbats heavy tick and false as a heavy cross

For example, to use the yn Boolean renderer, a field may attach a renderer named "boolean" and give it the 'yn' parameter:

```
<<isRetired{renderer=boolean('yn')}>>
```

which will render true as Y and false as N.

The Boolean renderer will also try to parse textual data into a Boolean value to allow a renderer to control the way it displays. For example, t, y, yes, and 1 are all considered "true".

### 3.1.3.1 Using the Wingdings Boolean Renderer

The wingdings renderers are unlike the other forms of renderers in that they rely on the template field actually being in the wingdings font in the first place. This means you would create the fields as required:

Docmosis Template Example

**Identity Provided**

Passport	«hasPP{renderer=boolean('wingdings1')}»
Driver's Licence	«hasDL{renderer=boolean('wingdings1')}»
Residential Bill	«hasRB{renderer=boolean('wingdings1')}»

Then change the font of the fields that are using the wingdings renderer to the wingdings font:



You may find that Word does not understand the dingbats characters, so if you choose Word as the output document type, you typically would not use dingbats character renderers. The dingbat Boolean renderer can be used with Word or Writer templates, the effect is only an issue in the output document.

### 3.1.4 Built-In Number Renderer

Given numeric data (even from a text source like XML), you can instruct Docmosis to format it in different ways by providing a formatting string. The formatting string describes how you want the number to appear.



**Important**

Number Formatting can also be achieved by using the built-in function "numFormat" (see 1.5.3.7). It is recommended to use the new function where possible.

The synopsis for the number renderer is:

```
number(<output format>[, <locale> ])
```

where:

```
output format = the desired output format
locale = an optional local to use for the formatting.
```

For Example - if the data for "myVal" was "1.23", the following table shows what different formats would produce:

Example Field	Result
<<myVal>>	1.23
<<myVal{renderer=number('0.0')}>>	1.2
<<myVal{renderer=number('\$0.00')}>>	\$1.23
<<myVal{renderer=number('0.0E0')}>>	1.2E0
<<myVal{renderer=number('###.###')}>>	1.23
<<myVal{renderer=number('000.000')}>>	001.230

The same results can be achieved by using the numFormat function:

Example Field	Result
<<myVal>>	1.23
<<{numFormat(myVal, '0.0')}>>	1.2
<<{numFormat(myVal, '\$0.00')}>>	\$1.23
<<{numFormat(myVal, '0.0E0')}>>	1.2E0
<<{numFormat(myVal, '###.###')}>>	1.23
<<{numFormat(myVal, '000.000')}>>	001.230



The following sections provide details about creating the formatting string.

### 3.1.4.1 Number Formatting Specifications

The formatting string should be constructed using the specific characters shown in the table below.

The placement and meaning of each character within the formatting string will determine how the input number will be formatted for display.

This table comes directly from Oracle's Java DecimalFormat class documentation:

Character	Location	Localized?	Meaning
0	Number	Yes	Digit
#	Number	Yes	Digit, zero shows as absent
.	Number	Yes	Decimal separator or monetary decimal separator
-	Number	Yes	Minus sign
,	Number	Yes	Grouping separator
E	Number	Yes	Separates mantissa and exponent in scientific notation. Need not be quoted in prefix or suffix.
;	Subpattern boundary	Yes	Separates positive and negative subpatterns
%	Prefix or suffix	Yes	Multiply by 100 and show as percentage
\u2030	Prefix or suffix	Yes	Multiply by 1000 and show as per mille value
¤ (\u00A4)	Prefix or suffix	No	Currency sign, replaced by currency symbol. If doubled, replaced by international currency symbol. If present in a pattern, the monetary decimal separator is used instead of the decimal separator. *Care must be taken when using the currency symbol since this changes over time with different versions of Java (see below)
'	Prefix or suffix	No	Used to quote special characters in a prefix or suffix, for example, "'#'#" formats 123 to "'#123'". To create a single quote itself, use two in a row: "'# o'clock'".

**Example 1.** The formatting string: ``#,##0.00'`, will be interpreted as follows:

- The `'.'` point character is used to indicate the position of the decimal point.
- The two `'0'` characters to the right of the point indicate that a digit should always be displayed in those positions. In the case where the number being formatted is an integer or only has one decimal place, then the result will be padded with trailing zeroes to the right.
- The output number will have as many leading digits as is needed to encode the number.
- The single `'0'` to the left of the point indicates that at a minimum of one digit should always be displayed to the left of the point. In the case where the number being formatted is less than one, then a leading zero will be used in the result. (eg: An input of `".12"` will display as `"0.12"`, however a formatting string of ``#.00'` string would result in `".12"` )
- This string also uses `','` to indicate the position of the thousands separator. There are three `'#'` characters between the `','` comma and the `'.'` point – so the digits to the left of the decimal point will be grouped in blocks of three.

**Example 2.** The formatting string: `'0000'`, will be interpreted as follows:

- There is no `'.'` point character so all numbers will be output as integers.
- There will always be at least four digits as the `'0'` character is used four times. If the input number only has 1, 2 or 3 digits – then the output will be padded with leading zeroes.
- If the input contains more than four digits then it will expand so that the whole number is displayed.

The table above also includes some locale-specific features such as the `'¤'` character. If you use the `'¤'` character in your formatting string, Docmosis will replace this with the currency sign for the locale being used. For example:

```
<<val{render=number('¤', 'UNITED STATES')}>>
```

with `val = 100` would render `US$100` whereas:

```
<<val{render=number('¤', 'UNITED KINGDOM')}>>
```

would render `£100` (the UK currency symbol).



---

### Important

Please note that the currency symbol behaviour has changed over time with different versions of Java so care must be taken if using this character.

---



### 3.1.4.2 Locale Specific Formatting

The number formatter can also be given a locale to use when processing the values and the format specification.

The locale used is by default the locale of the current environment. To override the default, a second parameter can be provided:

```
renderer=number(<format>[, <locale> ]);
```

For example, to interpret a currency in a German format:

```
<<myVal{renderer=number('#.#,00', 'GERMAN')}>>
```

Which would format "1500" as "1.500,00".

Note that the input data value is also interpreted according to the locale where necessary (for example the value is string data). So, for example, if using the GERMAN locale with string data "1,500.00" would result in an error because this is NOT a valid representation in the GERMAN locale.

The locale parameter, can be specified as a language or a country. The following table lists all the values that may be used to specify the Locale by country, language or code.

Country			Language		
Code	ISO CODE	Name	Code	ISO Code	Name
AL	ALB	Albania	sq	sqi	Albanian
AE	ARE	United Arab Emirates	ar	ara	Arabic
AR	ARG	Argentina	es	spa	Spanish
AU	AUS	Australia	en	eng	English
AT	AUT	Austria	de	deu	German
BE	BEL	Belgium	nl	nld	Dutch
BG	BGR	Bulgaria	bg	bul	Bulgarian
BH	BHR	Bahrain	ar	ara	Arabic
BY	BLR	Belarus	be	bel	Byelorussian
BO	BOL	Bolivia	es	spa	Spanish
BR	BRA	Brazil	pt	por	Portuguese
CA	CAN	Canada	fr	fra	French
CH	CHE	Switzerland	it	ita	Italian
CL	CHL	Chile	es	spa	Spanish
CN	CHN	China	zh	zho	Chinese
CO	COL	Colombia	es	spa	Spanish
CR	CRI	Costa Rica	es	spa	Spanish
CZ	CZE	Czech Republic	cs	ces	Czech
DE	DEU	Germany	de	deu	German
DK	DNK	Denmark	da	dan	Danish
DO	DOM	Dominican Republic	es	spa	Spanish
DZ	DZA	Algeria	ar	ara	Arabic



Country			Language		
Code	ISO CODE	Name	Code	ISO Code	Name
EC	ECU	Ecuador	es	spa	Spanish
EG	EGY	Egypt	ar	ara	Arabic
ES	ESP	Spain	ca	cat	Catalan
ES	ESP	Spain	es	spa	Spanish
EE	EST	Estonia	et	est	Estonian
FI	FIN	Finland	fi	fin	Finnish
FR	FRA	France	fr	fra	French
GB	GBR	United Kingdom	en	eng	English
GR	GRC	Greece	el	ell	Greek
GT	GTM	Guatemala	es	spa	Spanish
HK	HKG	Hong Kong	zh	zho	Chinese
HN	HND	Honduras	es	spa	Spanish
HR	HRV	Croatia	hr	hrv	Croatian
HU	HUN	Hungary	hu	hun	Hungarian
IN	IND	India	en	eng	English
IN	IND	India	hi	hin	Hindi
IE	IRL	Ireland	en	eng	English
IQ	IRQ	Iraq	ar	ara	Arabic
IS	ISL	Iceland	is	isl	Icelandic
IL	ISR	Israel	iw	heb	Hebrew
IT	ITA	Italy	it	ita	Italian
JO	JOR	Jordan	ar	ara	Arabic
JP	JPN	Japan	ja	jpn	Japanese
KR	KOR	South Korea	ko	kor	Korean
KW	KWT	Kuwait	ar	ara	Arabic
LB	LBN	Lebanon	ar	ara	Arabic
LY	LBY	Libya	ar	ara	Arabic
LT	LTU	Lithuania	lt	lit	Lithuanian
LU	LUX	Luxembourg	de	deu	German
LU	LUX	Luxembourg	fr	fra	French
LV	LVA	Latvia	lv	lav	Latvian (Lettish)
MA	MAR	Morocco	ar	ara	Arabic
MX	MEX	Mexico	es	spa	Spanish
MK	MKD	Macedonia	mk	mkd	Macedonian
NI	NIC	Nicaragua	es	spa	Spanish
NL	NLD	Netherlands	nl	nld	Dutch
NO	NOR	Norway	no	nor	Norwegian
NZ	NZL	New Zealand	en	eng	English
OM	OMN	Oman	ar	ara	Arabic
PA	PAN	Panama	es	spa	Spanish
PE	PER	Peru	es	spa	Spanish





Country			Language		
Code	ISO CODE	Name	Code	ISO Code	Name
PL	POL	Poland	pl	pol	Polish
PR	PRI	Puerto Rico	es	spa	Spanish
PT	PRT	Portugal	pt	por	Portuguese
PY	PRY	Paraguay	es	spa	Spanish
QA	QAT	Qatar	ar	ara	Arabic
RO	ROM	Romania	ro	ron	Romanian
RU	RUS	Russia	ru	rus	Russian
SA	SAU	Saudi Arabia	ar	ara	Arabic
SD	SDN	Sudan	ar	ara	Arabic
SV	SLV	El Salvador	es	spa	Spanish
SK	SVK	Slovakia	sk	slk	Slovak
SI	SVN	Slovenia	sl	slv	Slovenian
SE	SWE	Sweden	sv	swe	Swedish
SY	SYR	Syria	ar	ara	Arabic
TH	THA	Thailand	th	tha	Thai
TN	TUN	Tunisia	ar	ara	Arabic
TR	TUR	Turkey	tr	tur	Turkish
TW	TWN	Taiwan	zh	zho	Chinese
UA	UKR	Ukraine	uk	ukr	Ukrainian
UY	URY	Uruguay	es	spa	Spanish
US	USA	United States	en	eng	English
VE	VEN	Venezuela	es	spa	Spanish
YE	YEM	Yemen	ar	ara	Arabic
YU	YUG	Yugoslavia	sh	srp	Serbo-Croatian
YU	YUG	Yugoslavia	sr	srp	Serbian
ZA	ZAF	South Africa	en	eng	English

From Oracle's Java Locale class documentation for Java Version 7