

” **tutorial.do.txt** ”

TITLE: Doconce: Document Once, Include Anywhere
 AUTHOR: Hans Petter Langtangen at Simula Research Laboratory and University of Oslo
 DATE: today

- * When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?
- * Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like "LaTeX": "<http://refcards.com/docs/silvermanj/amslatex/LaTeXRefCard.v2.0.pdf>", "HTML": "<http://www.htmlcodetutorial.com/>", "reStructuredText": "<http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html>", "Sphinx": "<http://sphinx.pocoo.org/contents.html>", and "wiki": "<http://code.google.com/p/support/wiki/WikiSyntax>"? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?
- * Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.

===== The Doconce Concept =====

Doconce is two things:

- o Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word.
 (An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)
- o Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy. The slogan is: "Write once, include anywhere".

Here are some Doconce features:

” **tutorial.do.txt** ”

- * Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- * Doconce can be converted to plain **untagged** text, often desirable for computer programs and email.
- * Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- * Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- * Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- * Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- * Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- * Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- * Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

=====
What Does Doconce Look Like?
=====

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- * Bullet lists arise from lines starting with an asterisk.

” **tutorial.do.txt** ”

- * **Emphasized words** are surrounded by asterisks.
- * Words in boldface are surrounded by underscores.
- * Words from computer code are enclosed in back quotes and then typeset `'verbatim (in a monospace font)'`.
- * Section headings are recognized by equality (`'='`) signs before and after the title, and the number of `'='` signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
- * Paragraph headings are recognized by a double underscore before and after the heading.
- * The abstract of a document starts with **Abstract** as paragraph heading, and all text up to the next heading makes up the abstract,
- * Blocks of computer code can easily be included by placing `'!bc'` (begin code) and `'!ec'` (end code) commands at separate lines before and after the code block.
- * Blocks of computer code can also be imported from source files.
- * Blocks of LaTeX mathematics can easily be included by placing `'!bt'` (begin TeX) and `'!et'` (end TeX) commands at separate lines before and after the math block.
- * There is support for both LaTeX and text-like inline mathematics.
- * Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- * Invisible comments in the output format can be inserted throughout the text (`'#'` at the beginning of a line).
- * Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- * There is special support for advanced exercises features.
- * With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- * With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format:

```
!bc
===== A Subsection with Sample Text =====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for boldface words, **emphasized** words, and `'computer'` words look natural in plain text. Lists are typeset as you would do in an email,

- * item 1

” **tutorial.do.txt** ”

- * item 2
- * item 3

Lists can also have automatically numbered items instead of bullets,

- o item 1
- o item 2
- o item 3

URLs with a link word are possible, as in "hpl":"http://folk.uio.no/hpl". If the word is URL, the URL itself becomes the link name, as in "URL":"tutorial.do.txt".

References to sections may use logical names as labels (e.g., a "label" command right after the section title), as in the reference to Section ref{my:first:sec}.

Doconce also allows inline comments such as [hpl: here I will make some remarks to the text] for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section ref{doconce2formats} for an example).

Tables are also supported, e.g.,

time	velocity	acceleration
0.0	1.4186	-5.01
2.0	1.376512	11.919
4.0	1.1E+1	14.717624

lines beginning with # are comment lines

!ec

The Doconce text above results in the following little document:

```
===== A Subsection with Sample Text =====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for boldface words, **emphasized** words, and ``computer`` words look natural in plain text. Lists are typeset as you would do in an email,

- * item 1
- * item 2
- * item 3

Lists can also have numbered items instead of bullets, just use an 'o' (for ordered) instead of the asterisk:

- o item 1
- o item 2
- o item 3

URLs with a link word are possible, as in "hpl":"http://folk.uio.no/hpl". If the word is URL, the URL itself becomes the link name, as in "URL":"tutorial.do.txt".

References to sections may use logical names as labels (e.g., a

” **tutorial.do.txt** ”

"label" command right after the section title), as in the reference to Section `ref{my:first:sec}`.

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section `ref{doconce2formats}` for an example).

Tables are also supported, e.g.,

time	velocity	acceleration
0.0	1.4186	-5.01
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4.0	1.1E+1	14.717624

==== Mathematics and Computer Code ====

Inline mathematics, such as `$_nu = \sin(x)$|$_v = sin(x)$`, allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like `$_nu = \sin(x)$|$_v = sin(x)$` is typeset as

```
!bc
$_nu = \sin(x)$|$_v = sin(x)$
!ec
```

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `'!bt'` and `'!et'` (begin tex / end tex) instructions.

The result looks like this:

```
!bt
\begin{eqnarray}
\{\partial u \over \partial t\} \&=& \nabla^2 u + f, \text{label{myeq1}}\\
\{\partial v \over \partial t\} \&=& \nabla \cdot (q(u) \nabla v) + g
\end{eqnarray}
!et
```

Of course, such blocks only looks nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `'!bc'` and `'!ec'` instructions, respectively. Such blocks look like

```
!bc cod
from math import sin, pi
def myfunc(x):
    return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
!ec
```

A code block must come after some plain sentence (at least for successful output to `'sphinx'`, `'rst'`, and ASCII-close formats), not directly after a section/paragraph heading or a table.

” **tutorial.do.txt** ”

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `!bc xxx` where `xxx` is an identifier like `pycod` for code snippet in Python, `sys` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `ptex2tex` and defined in a configuration file `.ptext2tex.cfg`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

```
!bc
# sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
!ec
```

By default, `'pro'` and `'cod'` are `'python'`, `'sys'` is `'console'`, while `'xpro'` and `'xcod'` are computer language specific for `'x'` in `'f'` (Fortran), `'c'` (C), `'cpp'` (C++), `'pl'` (Perl), `'m'` (Matlab), `'sh'` (Unix shells), `'cy'` (Cython), and `'py'` (Python).

```
# (Any sphinx code-block comment, whether inside verbatim code
# blocks or outside, yields a mapping between bc arguments
# and computer languages. In case of multiple definitions, the
# first one is used.)
```

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `!bc pro`, while a part of a file is copied into a `!bc cod` environment. What `'pro'` and `'cod'` mean is then defined through a `.ptex2tex.cfg` file for LaTeX and a `'sphinx code-blocks'` comment for Sphinx.

Another document can be included by writing `#include "mynote.do.txt"` on a line starting with (another) hash sign. Doconce documents have extension `'do.txt'`. The `'do'` part stands for doconce, while the trailing `'.txt'` denotes a text document so that editors gives you the right writing environment for plain text.

```
==== Macros (Newcommands), Cross-References, Index, and Bibliography ====
label{newcommands}
```

Doconce supports a type of macros via a LaTeX-style `*newcommand*` construction. The newcommands defined in a file with name `'newcommand_replace.tex'` are expanded when Doconce is filtered to other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `'newcommands.tex'` and `'newcommands_keep.tex'` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `!bt` and `!et` in `'newcommands_keep.tex'` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `'newcommands_replace.tex'` and expanded by Doconce. The definitions of newcommands in the `'newcommands*.tex'` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

tutorial.do.txt

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the 'doc/manual/manual.do.txt' file (see the "demo page": "<https://doconce.googlecode.com/hg/doc/demos/manual/index.html>" for various formats of this document).

Example on including another Doconce file (using preprocess):

```
# #include "_doconce2anything.do.txt"
```

===== Demos =====

The current text is generated from a Doconce format stored in the file
!bc
docs/tutorial/tutorial.do.txt
!ec

The file 'make.sh' in the 'tutorial' directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, 'tutorial.do.txt' is the starting point. Running 'make.sh' and studying the various generated files and comparing them with the original 'tutorial.do.txt' file, gives a quick introduction to how Doconce is used in a real case. "Here": "<https://doconce.googlecode.com/hg/doc/demos/tutorial/index.html>" is a sample of how this tutorial looks in different formats.

There is another demo in the 'docs/manual' directory which translates the more comprehensive documentation, 'manual.do.txt', to various formats. The 'make.sh' script runs a set of translations.

===== Dependencies =====

If you make use of preprocessor directives in the Doconce source, either "Preprocess": "<http://code.google.com/p/preprocess>" or "Mako": "<http://www.makotemplates.org>" must be installed. To make LaTeX documents (without going through the reStructuredText format) you also need "ptex2tex": "<http://code.google.com/p/ptex2tex>" and some style files that 'ptex2tex' potentially makes use of. Going from reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX requires "docutils": "<http://docutils.sourceforge.net>". Making Sphinx documents requires of course "Sphinx": "<http://sphinx.pocoo.org>". All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to "Pandoc": "<http://johnmacfarlane.net/pandoc/>" is desired, the Pandoc Haskell program must of course be installed.

Doconce: Document Once, Include Anywhere

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Jan 5, 2012

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2 What Does Doconce Look Like?

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- Bullet lists arise from lines starting with an asterisk.
- *Emphasized words* are surrounded by asterisks.
- **Words in boldface** are surrounded by underscores.
- Words from computer code are enclosed in back quotes and then typeset `verbatim` (in a monospace font).
- Section headings are recognized by equality (=) signs before and after the title, and the number of = signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
- Paragraph headings are recognized by a double underscore before and after the heading.
- The abstract of a document starts with *Abstract* as paragraph heading, and all text up to the next heading makes up the abstract,
- Blocks of computer code can easily be included by placing `bc!` (begin code) and `ec!` (end code) commands at separate lines before and after the code block.
- Blocks of computer code can also be imported from source files.
- Blocks of \LaTeX mathematics can easily be included by placing `bt!` (begin TeX) and `et!` (end TeX) commands at separate lines before and after the math block.
- There is support for both \LaTeX and text-like inline mathematics.
- Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- Invisible comments in the output format can be inserted throughout the text (# at the beginning of a line).

- Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- There is special support for advanced exercises features.
- With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format:

```
===== A Subsection with Sample Text =====
label{my:first:sec}

Ordinary text looks like ordinary text, and the tags used for
_boldface_ words, *emphasized* words, and 'computer' words look
natural in plain text. Lists are typeset as you would do in an email,

    * item 1
    * item 2
    * item 3

Lists can also have automatically numbered items instead of bullets,

    o item 1
    o item 2
    o item 3

URLs with a link word are possible, as in "hpl":"http://folk.uio.no/hpl".
If the word is URL, the URL itself becomes the link name,
as in "URL":"tutorial.do.txt".

References to sections may use logical names as labels (e.g., a
"label" command right after the section title), as in the reference to
Section ref{my:first:sec}.

Doconce also allows inline comments such as [hpl: here I will make
some remarks to the text] for allowing authors to make notes. Inline
comments can be removed from the output by a command-line argument
(see Section ref{doconce2formats} for an example).

Tables are also supported, e.g.,

|-----|
|time | velocity | acceleration |
|-----r-----r-----r-----|
| 0.0 | 1.4186 | -5.01 |
| 2.0 | 1.376512 | 11.919 |
| 4.0 | 1.1E+1 | 14.717624 |
|-----|

# lines beginning with # are comment lines
```

The Doconce text above results in the following little document:

2.1 A Subsection with Sample Text

Ordinary text looks like ordinary text, and the tags used for **boldface** words, *emphasized* words, and computer words look natural in plain text. Lists are typeset as you would do in an email,

- item 1
- item 2
- item 3

Lists can also have numbered items instead of bullets, just use an `o` (for ordered) instead of the asterisk:

1. item 1
2. item 2
3. item 3

URLs with a link word are possible, as in [hpl](#). If the word is URL, the URL itself becomes the link name, as in [tutorial.do.txt](#).

References to sections may use logical names as labels (e.g., a "label" command right after the section title), as in the reference to Section 2.1.

Doconce also allows inline comments such as (**hpl**: *here I will make some remarks to the text*) for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section 3 for an example).

Tables are also supported, e.g.,

time	velocity	acceleration
0.0	1.4186	-5.01
2.0	1.376512	11.919
4.0	1.1E+1	14.717624

2.2 Mathematics and Computer Code

Inline mathematics, such as $\nu = \sin(x)$, allows the formula to be specified both as \LaTeX and as plain text. This results in a professional \LaTeX typesetting, but in other formats the text version normally looks better than raw \LaTeX mathematics with backslashes. An inline formula like $\nu = \sin(x)$ is typeset as

```
 $\nu = \sin(x)$  $v = \sin(x)$ 
```

The pipe symbol acts as a delimiter between \LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw \LaTeX , inside `bt!` and `et!` (`begin tex` / `end tex`) instructions. The result looks like this:

$$\frac{\partial u}{\partial t} = \nabla^2 u + f, \tag{1}$$

$$\frac{\partial v}{\partial t} = \nabla \cdot (q(u) \nabla v) + g \tag{2}$$

Of course, such blocks only look nice in \LaTeX . The raw \LaTeX syntax appears in all other formats (but can still be useful for those who can read \LaTeX syntax).

You can have blocks of computer code, starting and ending with `bc!` and `ec!` instructions, respectively. Such blocks look like

```
from math import sin, pi
def myfunc(x):
    return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to `sphinx`, `rst`, and ASCII-close formats), not directly after a section-/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `bc xxx!` where `xxx` is an identifier like `pycod` for code snippet in Python, `sys` for terminal session, etc. When Doconce is filtered to \LaTeX , these identifiers are used as in `ptex2tex` and defined in a configuration file `.ptext2tex.cfg`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

```
# sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
```

By default, `pro` and `cod` are `python`, `sys` is `console`, while `xpro` and `xcod` are computer language specific for `x` in `f` (Fortran), `c` (C), `cpp` (C++), `pl` (Perl), `m` (Matlab), `sh` (Unix shells), `cy` (Cython), and `py` (Python).

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `bc pro!`, while a part of a file is copied into a `bc cod!` environment. What `pro` and `cod` mean is then defined through a `.ptex2tex.cfg` file for \LaTeX and a `sphinx code-blocks` comment for Sphinx.

Another document can be included by writing `#include "mynote.do.txt"` on a line starting with (another) hash sign. Doconce documents have extension `do.txt`. The `do` part stands for doconce, while the trailing `.txt` denotes a text document so that editors give you the right writing environment for plain text.

2.3 Macros (Newcommands), Cross-References, Index, and Bibliography

Doconce supports a type of macros via a \LaTeX -style *newcommand* construction. The newcommands defined in a file with name `newcommand_replace.tex` are expanded when Doconce is filtered to other formats, except for \LaTeX (since \LaTeX performs the expansion itself). Newcommands in files with names `newcommands.tex` and `newcommands_keep.tex` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands \LaTeX

math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `bt!` and `et!` in `newcommands_keep.tex` to keep them unchanged, at least if they contribute to make the raw \LaTeX math text easier to read in the formats that cannot render \LaTeX . Newcommands used elsewhere throughout the text will usually be placed in `newcommands_replace.tex` and expanded by Doconce. The definitions of newcommands in the `newcommands*.tex` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the \LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of \LaTeX , making it easy for Doconce documents to be integrated in \LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `doc/manual/manual.do.txt` file (see the [demo page](#) for various formats of this document).

3 From Doconce to Other Formats

Transformation of a Doconce document `mydoc.do.txt` to various other formats applies the script `doconce format`:

Terminal

```
Terminal> doconce format format mydoc.do.txt
```

or just

Terminal

```
Terminal> doconce format format mydoc
```

The `mako` or `preprocess` programs are always used to preprocess the file first, and options to `mako` or `preprocess` can be added after the filename. For example,

Terminal

```
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5      # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5  # mako
```

The variable `FORMAT` is always defined as the current format when running `preprocess`. That is, in the last example, `FORMAT` is defined as `latex`. Inside the Doconce document one can then perform format specific actions through tests like `#if FORMAT == "latex"`.

Inline comments in the text are removed from the output by

Terminal

```
Terminal> doconce format latex mydoc --skip_inline_comments
```

One can also remove all such comments from the original Doconce file by running:

```
Terminal> doconce remove_inline_comments mydoc
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

3.1 HTML

Making an HTML version of a Doconce file `mydoc.do.txt` is performed by

Terminal

```
Terminal> doconce format html mydoc
```

The resulting file `mydoc.html` can be loaded into any web browser for viewing.

3.2 L^AT_EX

Making a L^AT_EX file `mydoc.tex` from `mydoc.do.txt` is done in two steps:

Step 1. Filter the doconce text to a pre-LaTeX form `mydoc.p.tex` for `ptex2tex`:

Terminal

```
Terminal> doconce format latex mydoc
```

LaTeX-specific commands ("newcommands") in math formulas and similar can be placed in files `newcommands.tex`, `newcommands_keep.tex`, or `newcommands_replace.tex` (see Section 2.3). If these files are present, they are included in the L^AT_EX document so that your commands are defined.

Step 2. Run `ptex2tex` (if you have it) to make a standard L^AT_EX file,

Terminal

```
Terminal> ptex2tex mydoc
```

or just perform a plain copy,

Terminal

```
Terminal> cp mydoc.p.tex mydoc.tex
```

Doconce generates a `.p.tex` file with some preprocessor macros that can be used to steer certain properties of the \LaTeX document. For example, to turn on the Helvetica font instead of the standard Computer Modern font, run

Terminal

```
Terminal> ptex2tex -DHELVETICA mydoc
```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard \LaTeX "maketitle" heading is also available through

Terminal

```
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
```

A separate titlepage can be generate by

Terminal

```
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
```

The `ptex2tex` tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in \LaTeX documents. After any `bc!` command in the Doconce source you can insert verbatim block styles as defined in your `.ptex2tex.cfg` file, e.g., `bc cod!` for a code snippet, where `cod` is set to a certain environment in `.ptex2tex.cfg` (e.g., `CodeIntended`). There are over 30 styles to choose from.

Step 3. Compile `mydoc.tex` and create the PDF file:

Terminal

```
Terminal> latex mydoc
Terminal> latex mydoc
Terminal> makeindex mydoc    # if index
Terminal> bibitem mydoc      # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
```

If one wishes to use the `Minted_Python`, `Minted_Cpp`, etc., environments in `ptex2tex` for typesetting code, the `minted \text{\LaTeX}` package is needed. This package is included by running `doconce format` with the `-DMINTED` option:

Terminal

```
Terminal> ptex2tex -DMINTED mydoc
```

In this case, latex must be run with the `-shell-escape` option:

Terminal

```
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc
```

The `-shell-escape` option is required because the `minted.sty` style file runs the `pygments` program to format code, and this program cannot be run from latex without the `-shell-escape` option.

3.3 Plain ASCII Text

We can go from Doconce "back to" plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code:

Terminal

```
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
```

3.4 reStructuredText

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file `mydoc.rst`:

Terminal

```
Terminal> doconce format rst mydoc.do.txt
```

We may now produce various other formats:

Terminal

```
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
```

The OpenOffice file `mydoc.odt` can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

3.5 Sphinx

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the `doconce sphinx_dir` command:

Terminal

```
Terminal> doconce sphinx_dir author="authors' names" \  
          title="some title" version=1.0 dirname=sphinx_dir \  
          theme=mytheme file1 file2 file3 ...
```

The keywords `author`, `title`, and `version` are used in the headings of the Sphinx document. By default, `version` is 1.0 and the script will try to deduce authors and title from the doconce files `file1`, `file2`, etc. that together represent the whole document. Note that none of the individual Doconce files `file1`, `file2`, etc. should include the rest as their union makes up the whole document. The default value of `dirname` is `sphinx-rootdir`. The `theme` keyword is used to set the theme for design of HTML output from Sphinx (the default theme is 'default').

With a single-file document in `mydoc.do.txt` one often just runs

Terminal

```
Terminal> doconce sphinx_dir mydoc
```

and then an appropriate Sphinx directory `sphinx-rootdir` is made with relevant files.

The `doconce sphinx_dir` command generates a script `automake-sphinx.sh` for compiling the Sphinx document into an HTML document. This script copies directories named `figs` or `figures` over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, `automake-sphinx.sh` must be edited accordingly. One can either run `automake-sphinx.sh` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `conf.py` configuration file for Sphinx is edited accordingly, and a script `make-themes.sh` can make HTML documents with one or more themes. For example, to realize the themes `fenics` and `pyramid`, one writes

Terminal

```
Terminal> ./make-themes.sh fenics pyramid
```

The resulting directories with HTML documents are `_build/html_fenics` and `_build/html_pyramid`, respectively. Without arguments, `make-themes.sh` makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file `mydoc.do.txt`.

Step 1. Translate Doconce into the Sphinx dialect of the reStructuredText format:

Terminal

```
Terminal> doconce format sphinx mydoc
```

Step 2. Create a Sphinx root directory with a `conf.py` file, either manually or by using the interactive `sphinx-quickstart` program. Here is a scripted version of the steps with the latter:

Terminal

```
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
-
Name of My Sphinx Document
Author
version
version
.rst
index
n
y
n
n
n
n
y
n
n
y
y
y
y
EOF
```

Step 3. Copy the `tutorial.rst` file to the Sphinx root directory:

Terminal

```
Terminal> cp mydoc.rst sphinx-rootdir
```

If you have figures in your document, the relative paths to those will be invalid when you work with `mydoc.rst` in the `sphinx-rootdir` directory. Either edit `mydoc.rst` so that figure file paths are correct, or simply copy your figure directories to `sphinx-rootdir`.

Step 4. Edit the generated `index.rst` file so that `mydoc.rst` is included, i.e., add `mydoc` to the `toctree` section so that it becomes

```
.. toctree::
   :maxdepth: 2

   mydoc
```

(The spaces before `mydoc` are important!)

Step 5. Generate, for instance, an HTML version of the Sphinx source:

Terminal

```
make clean # remove old versions
make html
```

Step 6. View the result:

Terminal

```
Terminal> firefox _build/html/index.html
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows `bc!`: `cod` gives Python (`code-block:: python` in Sphinx syntax) and `cppcod` gives C++, but all such arguments can be customized both for Sphinx and \LaTeX output.

3.6 Google Code Wiki

There are several different wiki dialects, but Doconce only support the one used by [Google Code](#). The transformation to this format, called `gwiki` to explicitly mark it as the Google Code dialect, is done by

Terminal

```
Terminal> doconce format gwiki mydoc.do.txt
```

You can then open a new wiki page for your Google Code project, copy the `mydoc.gwiki` output file from `doconce format` and paste the file contents into the wiki page. Press **Preview** or **Save Page** to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

3.7 Tweaking the Doconce Output

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the `.rst` file is going to be

filtered to \LaTeX or HTML, it cannot know if `.eps` or `.png` is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., `sed`, `perl`, `python`, or `scitools subst`, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The `make.sh` files in `docs/manual` and `docs/tutorial` constitute comprehensive examples on how such scripts can be made.

3.8 Demos

The current text is generated from a Doconce format stored in the file

```
docs/tutorial/tutorial.do.txt
```

The file `make.sh` in the `tutorial` directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, `tutorial.do.txt` is the starting point. Running `make.sh` and studying the various generated files and comparing them with the original `tutorial.do.txt` file, gives a quick introduction to how Doconce is used in a real case. [Here](#) is a sample of how this tutorial looks in different formats.

There is another demo in the `docs/manual` directory which translates the more comprehensive documentation, `manual.do.txt`, to various formats. The `make.sh` script runs a set of translations.

3.9 Dependencies

If you make use of preprocessor directives in the Doconce source, either [Preprocess](#) or [Mako](#) must be installed. To make \LaTeX documents (without going through the `reStructuredText` format) you also need [ptex2tex](#) and some style files that `ptex2tex` potentially makes use of. Going from `reStructuredText` to formats such as XML, OpenOffice, HTML, and \LaTeX requires [docutils](#). Making Sphinx documents requires of course [Sphinx](#). All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to [Pandoc](#) is desired, the Pandoc Haskell program must of course be installed.

Doconce: Document Once, Include Anywhere

Author: Hans Petter Langtangen

Date: Jan 5, 2012

- When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?
- Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like [LaTeX](#), [HTML](#), [reStructuredText](#), [Sphinx](#), and [wiki](#)? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?
- Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.

The Doconce Concept

Doconce is two things:

1. Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word. (An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)
2. Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy. The slogan is: “Write once, include anywhere”.

Here are some Doconce features:

- Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- Doconce can be converted to plain *untagged* text, often desirable for computer programs and email.
- Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

What Does Doconce Look Like?

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- Bullet lists arise from lines starting with an asterisk.
- *Emphasized words* are surrounded by asterisks.
- **Words in boldface** are surrounded by underscores.
- Words from computer code are enclosed in back quotes and then typeset `verbatim` (in a monospace font).
- Section headings are recognized by equality (=) signs before and after the title, and the number of = signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
- Paragraph headings are recognized by a double underscore before and after the heading.
- The abstract of a document starts with *Abstract* as paragraph heading, and all text up to the next heading makes up the abstract,
- Blocks of computer code can easily be included by placing `!bc` (begin code) and `!ec` (end code) commands at separate lines before and after the code block.
- Blocks of computer code can also be imported from source files.
- Blocks of LaTeX mathematics can easily be included by placing `!bt` (begin TeX) and `!et` (end TeX) commands at separate lines before and after the math block.
- There is support for both LaTeX and text-like inline mathematics.
- Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- Invisible comments in the output format can be inserted throughout the text (# at the beginning of a line).
- Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- There is special support for advanced exercises features.
- With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format:

```
===== A Subsection with Sample Text =====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for `_boldface_` words, `*emphasized*` words, and `'computer'` words look natural in plain text. Lists are typeset as you would do in an email,

- ```
* item 1
* item 2
```



\* item 3

Lists can also have automatically numbered items instead of bullets,

o item 1  
o item 2  
o item 3

URLs with a link word are possible, as in "hpl":"http://folk.uio.no/hpl". If the word is URL, the URL itself becomes the link name, as in "URL":"tutorial.do.txt".

References to sections may use logical names as labels (e.g., a "label" command right after the section title), as in the reference to Section ref{my:first:sec}.

Doconce also allows inline comments such as [hpl: here I will make some remarks to the text] for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section ref{doconce2formats} for an example).

Tables are also supported, e.g.,

| -----                 |          |              |
|-----------------------|----------|--------------|
| time                  | velocity | acceleration |
| ---r-----r-----r----- |          |              |
| 0.0                   | 1.4186   | -5.01        |
| 2.0                   | 1.376512 | 11.919       |
| 4.0                   | 1.1E+1   | 14.717624    |
| -----                 |          |              |

# lines beginning with # are comment lines

The Doconce text above results in the following little document:

## A Subsection with Sample Text

Ordinary text looks like ordinary text, and the tags used for **boldface** words, *emphasized* words, and computer words look natural in plain text. Lists are typeset as you would do in an email,

- item 1
- item 2
- item 3

Lists can also have numbered items instead of bullets, just use an o (for ordered) instead of the asterisk:

1. item 1
2. item 2

### 3. item 3

URLs with a link word are possible, as in [hpl](#). If the word is URL, the URL itself becomes the link name, as in [tutorial.do.txt](#).

References to sections may use logical names as labels (e.g., a “label” command right after the section title), as in the reference to the section [A Subsection with Sample Text](#).

Doconce also allows inline comments such as (**hpl**: here I will make some remarks to the text) for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see the section [From Doconce to Other Formats](#) for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

## Mathematics and Computer Code

Inline mathematics, such as  $v = \sin(x)$ , allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like  $v = \sin(x)$  is typeset as:

`$\nu = \sin(x)$| $v = \sin(x)$`

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `!bt` and `!et` (begin tex / end tex) instructions. The result looks like this:

```
\begin{eqnarray}
\{\partial u \over \partial t\} \&=& \nabla^2 u + f, \text{label{myeq1}} \\
\{\partial v \over \partial t\} \&=& \nabla \cdot (q(u) \nabla v) + g
\end{eqnarray}
```

Of course, such blocks only look nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `!bc` and `!ec` instructions, respectively. Such blocks look like:

```
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to `sphinx`, `rst`, and ASCII-close formats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `!bc xxx` where `xxx` is an identifier like `pycod` for code snippet in Python, `sys` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `ptex2tex` and defined in a configuration file `.ptex2tex.cfg`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

```
sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
```

By default, `pro` and `cod` are `python`, `sys` is `console`, while `xpro` and `xcod` are computer language specific for `x` in `f` (Fortran), `c` (C), `cpp` (C++), `pl` (Perl), `m` (Matlab), `sh` (Unix shells), `cy` (Cython), and `py` (Python).

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `!bc pro`, while a part of a file is copied into a `!bc cod` environment. What `pro` and `cod` mean is then defined through a `.ptex2tex.cfg` file for LaTeX and a `sphinx code-blocks` comment for Sphinx.

Another document can be included by writing `#include "mynote.do.txt"` on a line starting with (another) hash sign. Doconce documents have extension `do.txt`. The `do` part stands for doconce, while the trailing `.txt` denotes a text document so that editors gives you the right writing enviroment for plain text.

## Macros (Newcommands), Cross-References, Index, and Bibliography

Doconce supports a type of macros via a LaTeX-style *newcommand* construction. The newcommands defined in a file with name `newcommand_replace.tex` are expanded when Doconce is filtered to other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `newcommands.tex` and `newcommands_keep.tex` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `!bt` and `!et` in `newcommands_keep.tex` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `newcommands_replace.tex` and expanded by Doconce. The definitions of newcommands in the `newcommands*.tex` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `doc/manual/manual.do.txt` file (see the [demo page](#) for various formats of this document).

## From Doconce to Other Formats

Transformation of a Doconce document `mydoc.do.txt` to various other formats applies the script `doconce format`:

```
Terminal> doconce format format mydoc.do.txt
```

or just:

```
Terminal> doconce format format mydoc
```

The `mako` or `preprocess` programs are always used to preprocess the file first, and options to `mako` or `preprocess` can be added after the filename. For example:

```
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # mako
```

The variable `FORMAT` is always defined as the current format when running `preprocess`. That is, in the last example, `FORMAT` is defined as `latex`. Inside the Doconce document one can then perform format specific actions through tests like `#if FORMAT == "latex"`.

Inline comments in the text are removed from the output by:

```
Terminal> doconce format latex mydoc --skip_inline_comments
```

One can also remove all such comments from the original Doconce file by running:

```
Terminal> doconce remove_inline_comments mydoc
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

## HTML

Making an HTML version of a Doconce file `mydoc.do.txt` is performed by:

```
Terminal> doconce format html mydoc
```

The resulting file `mydoc.html` can be loaded into any web browser for viewing.

## LaTeX

Making a LaTeX file `mydoc.tex` from `mydoc.do.txt` is done in two steps: ..

Note: putting code blocks inside a list is not successful in many

**Step 1. Filter the doconce text to a pre-LaTeX form `mydoc.p.tex` for `ptex2tex`:**

```
Terminal> doconce format latex mydoc
```

LaTeX-specific commands (“newcommands”) in math formulas and similar can be placed in files `newcommands.tex`, `newcommands_keep.tex`, or `newcommands_replace.tex` (see the section [Macros \(Newcommands\), Cross-References, Index, and Bibliography](#)). If these files are present, they are included in the LaTeX document so that your commands are defined.

*Step 2.* Run `ptex2tex` (if you have it) to make a standard LaTeX file:

```
Terminal> ptex2tex mydoc
```

or just perform a plain copy:

```
Terminal> cp mydoc.p.tex mydoc.tex
```

Doconce generates a `.p.tex` file with some preprocessor macros that can be used to steer certain properties of the LaTeX document. For example, to turn on the Helvetica font instead of the standard Computer Modern font, run:

```
Terminal> ptex2tex -DHELIVETICA mydoc
```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX “maketitle” heading is also available through:

```
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
```

A separate titlepage can be generate by:

```
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
```

The `ptex2tex` tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any `!bc` command in the Doconce source you can insert verbatim block styles as defined in your `.ptex2tex.cfg` file, e.g., `!bc cod` for a code snippet, where `cod` is set to a certain environment in `.ptex2tex.cfg` (e.g., `CodeIntended`). There are over 30 styles to choose from.

*Step 3.* Compile `mydoc.tex` and create the PDF file:

```
Terminal> latex mydoc
Terminal> latex mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
```

If one wishes to use the `Minted_Python`, `Minted_Cpp`, etc., environments in `ptex2tex` for typesetting code, the `minted` LaTeX package is needed. This package is included by running `doconce format` with the `-DMINTED` option:

```
Terminal> ptex2tex -DMINTED mydoc
```

In this case, `latex` must be run with the `-shell-escape` option:

```
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc
```

The `-shell-escape` option is required because the `minted.sty` style file runs the `pygments` program to format code, and this program cannot be run from `latex` without the `-shell-escape` option.

## Plain ASCII Text

We can go from Doconce “back to” plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code:

```
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
```

## reStructuredText

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file `mydoc.rst`:

```
Terminal> doconce format rst mydoc.do.txt
```

We may now produce various other formats:

```
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
```

The OpenOffice file `mydoc.odt` can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

## Sphinx

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the `doconce sphinx_dir` command:

```
Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinx_dir \
 theme=mytheme file1 file2 file3 ...
```

The keywords `author`, `title`, and `version` are used in the headings of the Sphinx document. By default, `version` is 1.0 and the script will try to deduce authors and title from the doconce files `file1`, `file2`, etc. that together represent the whole document. Note that none of the individual Doconce files `file1`, `file2`, etc. should include the rest as their union makes up the whole document. The default value of `dirname` is `sphinx-rootdir`. The `theme` keyword is used to set the theme for design of HTML output from Sphinx (the default theme is `'default'`).

With a single-file document in `mydoc.do.txt` one often just runs:

```
Terminal> doconce sphinx_dir mydoc
```

and then an appropriate Sphinx directory `sphinx-rootdir` is made with relevant files.

The `doconce sphinx_dir` command generates a script `automake-sphinx.sh` for compiling the Sphinx document into an HTML document. This script copies directories named `figs` or `figures` over to the Sphinx directory so that figures are

accessible in the Sphinx compilation. If figures or movies are located in other directories, `automake-sphinx.sh` must be edited accordingly. One can either run `automake-sphinx.sh` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `conf.py` configuration file for Sphinx is edited accordingly, and a script `make-themes.sh` can make HTML documents with one or more themes. For example, to realize the themes `fenics` and `pyramid`, one writes:

```
Terminal> ./make-themes.sh fenics pyramid
```

The resulting directories with HTML documents are `_build/html_fenics` and `_build/html_pyramid`, respectively. Without arguments, `make-themes.sh` makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file `mydoc.do.txt`.

*Step 1.* Translate Doconce into the Sphinx dialect of the reStructuredText format:

```
Terminal> doconce format sphinx mydoc
```

*Step 2.* Create a Sphinx root directory with a `conf.py` file, either manually or by using the interactive `sphinx-quickstart` program. Here is a scripted version of the steps with the latter:

```
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
-
Name of My Sphinx Document
Author
version
version
.rst
index
n
Y
n
n
n
n
n
Y
n
n
Y
Y
Y
EOF
```

*Step 3.* Copy the `tutorial.rst` file to the Sphinx root directory:

```
Terminal> cp mydoc.rst sphinx-rootdir
```

If you have figures in your document, the relative paths to those will be invalid when you work with `mydoc.rst` in the `sphinx-rootdir` directory. Either edit `mydoc.rst` so that figure file paths are correct, or simply copy your figure directories to `sphinx-rootdir`.

*Step 4.* Edit the generated `index.rst` file so that `mydoc.rst` is included, i.e., add `mydoc` to the `toctree` section so that it becomes:

```
.. toctree::
 :maxdepth: 2
```

```
 mydoc
```

(The spaces before `mydoc` are important!)

*Step 5.* Generate, for instance, an HTML version of the Sphinx source:

```
make clean # remove old versions
make html
```

*Step 6.* View the result:

```
Terminal> firefox _build/html/index.html
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows `!bc`: `cod` gives Python (code-block:: python in Sphinx syntax) and `cppcod` gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

## Google Code Wiki

There are several different wiki dialects, but Doconce only support the one used by [Google Code](#). The transformation to this format, called `gwiki` to explicitly mark it as the Google Code dialect, is done by:

```
Terminal> doconce format gwiki mydoc.do.txt
```

You can then open a new wiki page for your Google Code project, copy the `mydoc.gwiki` output file from `doconce format` and paste the file contents into the wiki page. Press **Preview** or **Save Page** to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

## Tweaking the Doconce Output

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the `.rst` file is going to be filtered to LaTeX or HTML, it cannot know if `.eps` or `.png` is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., `sed`, `perl`, `python`, or `scitools subst`, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The `make.sh` files in `docs/manual` and `docs/tutorial` constitute comprehensive examples on how such scripts can be made.



## Demos

The current text is generated from a Doconce format stored in the file:

```
docs/tutorial/tutorial.do.txt
```

The file `make.sh` in the `tutorial` directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, `tutorial.do.txt` is the starting point. Running `make.sh` and studying the various generated files and comparing them with the original `tutorial.do.txt` file, gives a quick introduction to how Doconce is used in a real case. [Here](#) is a sample of how this tutorial looks in different formats.

There is another demo in the `docs/manual` directory which translates the more comprehensive documentation, `manual.do.txt`, to various formats. The `make.sh` script runs a set of translations.

## Dependencies

**system-message**

**WARNING/2** in `tutorial.rst`, line 398

Duplicate explicit target name: “sphinx”.

If you make use of preprocessor directives in the Doconce source, either [Preprocess](#) or [Mako](#) must be installed. To make LaTeX documents (without going through the reStructuredText format) you also need [ptex2tex](#) and some style files that `ptex2tex` potentially makes use of. Going from reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX requires [docutils](#). Making Sphinx documents requires of course [Sphinx](#). All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to [Pandoc](#) is desired, the Pandoc Haskell program must of course be installed.

---

# **Doconce: Document Once, Include Anywhere Documentation**

***Release 1.0***

**Hans Petter Langtangen**

January 05, 2012



# CONTENTS

|          |                                                                           |           |
|----------|---------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>Doconce: Document Once, Include Anywhere</b>                           | <b>3</b>  |
| <b>2</b> | <b>The Doconce Concept</b>                                                | <b>5</b>  |
| <b>3</b> | <b>What Does Doconce Look Like?</b>                                       | <b>7</b>  |
| 3.1      | A Subsection with Sample Text . . . . .                                   | 8         |
| 3.2      | Mathematics and Computer Code . . . . .                                   | 9         |
| 3.3      | Macros (Newcommands), Cross-References, Index, and Bibliography . . . . . | 10        |
| <b>4</b> | <b>From Doconce to Other Formats</b>                                      | <b>11</b> |
| 4.1      | HTML . . . . .                                                            | 11        |
| 4.2      | LaTeX . . . . .                                                           | 12        |
| 4.3      | Plain ASCII Text . . . . .                                                | 13        |
| 4.4      | reStructuredText . . . . .                                                | 13        |
| 4.5      | Sphinx . . . . .                                                          | 13        |
| 4.6      | Google Code Wiki . . . . .                                                | 15        |
| 4.7      | Tweaking the Doconce Output . . . . .                                     | 15        |
| 4.8      | Demos . . . . .                                                           | 15        |
| 4.9      | Dependencies . . . . .                                                    | 16        |
| <b>5</b> | <b>Indices and tables</b>                                                 | <b>17</b> |



Contents:



# DOCONCE: DOCUMENT ONCE, INCLUDE ANYWHERE

**Author** Hans Petter Langtangen

**Date** Jan 5, 2012

- When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?
- Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like LaTeX, HTML, reStructuredText, Sphinx, and wiki? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?
- Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.





# THE DOCONCE CONCEPT

Doconce is two things:

1. Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word. (An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)
2. Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy. The slogan is: “Write once, include anywhere”.

Here are some Doconce features:

- Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- Doconce can be converted to plain *untagged* text, often desirable for computer programs and email.
- Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

# WHAT DOES DOCONCE LOOK LIKE?

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- Bullet lists arise from lines starting with an asterisk.
- *Emphasized words* are surrounded by asterisks.
- **Words in boldface** are surrounded by underscores.
- Words from computer code are enclosed in back quotes and then typeset `verbatim` (in a monospace font).
- Section headings are recognized by equality (=) signs before and after the title, and the number of = signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
- Paragraph headings are recognized by a double underscore before and after the heading.
- The abstract of a document starts with *Abstract* as paragraph heading, and all text up to the next heading makes up the abstract,
- Blocks of computer code can easily be included by placing `!bc` (begin code) and `!ec` (end code) commands at separate lines before and after the code block.
- Blocks of computer code can also be imported from source files.
- Blocks of LaTeX mathematics can easily be included by placing `!bt` (begin TeX) and `!et` (end TeX) commands at separate lines before and after the math block.
- There is support for both LaTeX and text-like inline mathematics.
- Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- Invisible comments in the output format can be inserted throughout the text (# at the beginning of a line).
- Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- There is special support for advanced exercises features.
- With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format:

```
===== A Subsection with Sample Text =====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for `_boldface_` words, `*emphasized*` words, and ``computer`` words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

Lists can also have automatically numbered items instead of bullets,

- o item 1
- o item 2
- o item 3

URLs with a link word are possible, as in `"hpl":"http://folk.uio.no/hpl"`. If the word is URL, the URL itself becomes the link name, as in `"URL":"tutorial.do.txt"`.

References to sections may use logical names as labels (e.g., a `"label"` command right after the section title), as in the reference to `Section ref{my:first:sec}`.

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see `Section ref{doconce2formats}` for an example).

Tables are also supported, e.g.,

```
|-----|
|time | velocity | acceleration |
|---r---r-----r-----|
| 0.0 | 1.4186 | -5.01 |
| 2.0 | 1.376512 | 11.919 |
| 4.0 | 1.1E+1 | 14.717624 |
|-----|
```

# lines beginning with # are comment lines

The Doconce text above results in the following little document:

### 3.1 A Subsection with Sample Text

Ordinary text looks like ordinary text, and the tags used for **boldface** words, *emphasized* words, and `computer` words look natural in plain text. Lists are typeset as you would do in an email,

- item 1
- item 2
- item 3

Lists can also have numbered items instead of bullets, just use an `o` (for ordered) instead of the asterisk:

1. item 1
2. item 2
3. item 3

URLs with a link word are possible, as in [hpl](#). If the word is URL, the URL itself becomes the link name, as in [tutorial.do.txt](#).

References to sections may use logical names as labels (e.g., a “label” command right after the section title), as in the reference to the section [A Subsection with Sample Text](#).

Doconce also allows inline comments such as (**hpl**: here I will make some remarks to the text) for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see the section [From Doconce to Other Formats](#) for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

## 3.2 Mathematics and Computer Code

Inline mathematics, such as  $\nu = \sin(x)$ , allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like  $\nu = \sin(x)$  is typeset as

`$\nu = \sin(x)$` | `$v = \sin(x)$`

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `!bt` and `!et` (begin tex / end tex) instructions. The result looks like this:

$$\begin{aligned}\frac{\partial u}{\partial t} &= \nabla^2 u + f, \\ \frac{\partial v}{\partial t} &= \nabla \cdot (q(u) \nabla v) + g\end{aligned}\tag{3.1}$$

Of course, such blocks only looks nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `!bc` and `!ec` instructions, respectively. Such blocks look like

```
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to `sphinx`, `rst`, and ASCII-close formats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `!bc xxx` where `xxx` is an identifier like `pycod` for code snippet in Python, `sys` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `ptex2tex` and defined in a configuration file `.ptext2tex.cfg`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

```
sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
```

By default, `pro` and `cod` are `python`, `sys` is `console`, while `xpro` and `xcod` are computer language specific for `x` in `f` (Fortran), `c` (C), `cpp` (C++), `pl` (Perl), `m` (Matlab), `sh` (Unix shells), `cy` (Cython), and `py` (Python).

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `!bc pro`, while a part of a file is copied into a `!bc cod` environment. What `pro` and `cod` mean is then defined through a `.ptex2tex.cfg` file for LaTeX and a `sphinx code-blocks` comment for Sphinx.

Another document can be included by writing `#include "mynote.do.txt"` on a line starting with (another) hash sign. Doconce documents have extension `do.txt`. The `do` part stands for doconce, while the trailing `.txt` denotes a text document so that editors gives you the right writing enviroment for plain text.

### 3.3 Macros (Newcommands), Cross-References, Index, and Bibliography

Doconce supports a type of macros via a LaTeX-style *newcommand* construction. The newcommands defined in a file with name `newcommand_replace.tex` are expanded when Doconce is filtered to other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `newcommands.tex` and `newcommands_keep.tex` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `!bt` and `!et` in `newcommands_keep.tex` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `newcommands_replace.tex` and expanded by Doconce. The definitions of newcommands in the `newcommands*.tex` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `doc/manual/manual.do.txt` file (see the [demo page](#) for various formats of this document).

# FROM DOCONCE TO OTHER FORMATS

Transformation of a Doconce document `mydoc.do.txt` to various other formats applies the script `doconce` format:

```
Terminal> doconce format format mydoc.do.txt
```

or just

```
Terminal> doconce format format mydoc
```

The `mako` or `preprocess` programs are always used to preprocess the file first, and options to `mako` or `preprocess` can be added after the filename. For example,

```
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # mako
```

The variable `FORMAT` is always defined as the current format when running `preprocess`. That is, in the last example, `FORMAT` is defined as `latex`. Inside the Doconce document one can then perform format specific actions through tests like `#if FORMAT == "latex"`.

Inline comments in the text are removed from the output by

```
Terminal> doconce format latex mydoc --skip_inline_comments
```

One can also remove all such comments from the original Doconce file by running:

```
Terminal> doconce remove_inline_comments mydoc
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

## 4.1 HTML

Making an HTML version of a Doconce file `mydoc.do.txt` is performed by

```
Terminal> doconce format html mydoc
```

The resulting file `mydoc.html` can be loaded into any web browser for viewing.



## 4.2 LaTeX

Making a LaTeX file `mydoc.tex` from `mydoc.do.txt` is done in two steps: .. Note: putting code blocks inside a list is not successful in many

**Step 1. Filter the doconce text to a pre-LaTeX form `mydoc.p.tex` for `ptex2tex`:**

```
Terminal> doconce format latex mydoc
```

LaTeX-specific commands (“newcommands”) in math formulas and similar can be placed in files `newcommands.tex`, `newcommands_keep.tex`, or `newcommands_replace.tex` (see the section *Macros (Newcommands), Cross-References, Index, and Bibliography*). If these files are present, they are included in the LaTeX document so that your commands are defined.

**Step 2. Run `ptex2tex` (if you have it) to make a standard LaTeX file,**

```
Terminal> ptex2tex mydoc
```

or just perform a plain copy,

```
Terminal> cp mydoc.p.tex mydoc.tex
```

Doconce generates a `.p.tex` file with some preprocessor macros that can be used to steer certain properties of the LaTeX document. For example, to turn on the Helvetica font instead of the standard Computer Modern font, run

```
Terminal> ptex2tex -DHELVETICA mydoc
```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX “maketitle” heading is also available through

```
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
```

A separate titlepage can be generate by

```
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
```

The `ptex2tex` tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any `!bc` command in the Doconce source you can insert verbatim block styles as defined in your `.ptex2tex.cfg` file, e.g., `!bc cod` for a code snippet, where `cod` is set to a certain environment in `.ptex2tex.cfg` (e.g., `CodeIntended`). There are over 30 styles to choose from.

**Step 3. Compile `mydoc.tex` and create the PDF file:**

```
Terminal> latex mydoc
Terminal> latex mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
```

If one wishes to use the `Minted_Python`, `Minted_Cpp`, etc., environments in `ptex2tex` for typesetting code, the `minted` LaTeX package is needed. This package is included by running `doconce format` with the `-DMINTED` option:

```
Terminal> ptex2tex -DMINTED mydoc
```

In this case, `latex` must be run with the `-shell-escape` option:

```
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
```

```
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc
```

The `-shell-escape` option is required because the `minted.sty` style file runs the `pygments` program to format code, and this program cannot be run from `latex` without the `-shell-escape` option.

## 4.3 Plain ASCII Text

We can go from Doconce “back to” plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code:

```
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
```

## 4.4 reStructuredText

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file `mydoc.rst`:

```
Terminal> doconce format rst mydoc.do.txt
```

We may now produce various other formats:

```
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
```

The OpenOffice file `mydoc.odt` can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

## 4.5 Sphinx

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the `doconce sphinx_dir` command:

```
Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinx_dir \
 theme=mytheme file1 file2 file3 ...
```

The keywords `author`, `title`, and `version` are used in the headings of the Sphinx document. By default, `version` is 1.0 and the script will try to deduce authors and title from the doconce files `file1`, `file2`, etc. that together represent the whole document. Note that none of the individual Doconce files `file1`, `file2`, etc. should include the rest as their union makes up the whole document. The default value of `dirname` is `sphinx-rootdir`. The `theme` keyword is used to set the theme for design of HTML output from Sphinx (the default theme is `'default'`).

With a single-file document in `mydoc.do.txt` one often just runs

```
Terminal> doconce sphinx_dir mydoc
```

and then an appropriate Sphinx directory `sphinx-rootdir` is made with relevant files.

The `doconce sphinx_dir` command generates a script `automake-sphinx.sh` for compiling the Sphinx document into an HTML document. This script copies directories named `figs` or `figures` over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, `automake-sphinx.sh` must be edited accordingly. One can either run `automake-sphinx.sh` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `conf.py` configuration file for Sphinx is edited accordingly, and a script `make-themes.sh` can make HTML documents with one or more themes. For example, to realize the themes `fenics` and `pyramid`, one writes

```
Terminal> ./make-themes.sh fenics pyramid
```

The resulting directories with HTML documents are `_build/html_fenics` and `_build/html_pyramid`, respectively. Without arguments, `make-themes.sh` makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file `mydoc.do.txt`.

*Step 1.* Translate Doconce into the Sphinx dialect of the reStructuredText format:

```
Terminal> doconce format sphinx mydoc
```

*Step 2.* Create a Sphinx root directory with a `conf.py` file, either manually or by using the interactive `sphinx-quickstart` program. Here is a scripted version of the steps with the latter:

```
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
—
Name of My Sphinx Document
Author
version
version
.rst
index
n
Y
n
n
n
n
Y
n
n
Y
Y
Y
EOF
```

*Step 3.* Copy the `tutorial.rst` file to the Sphinx root directory:

```
Terminal> cp mydoc.rst sphinx-rootdir
```

If you have figures in your document, the relative paths to those will be invalid when you work with `mydoc.rst` in the `sphinx-rootdir` directory. Either edit `mydoc.rst` so that figure file paths are correct, or simply copy your figure directories to `sphinx-rootdir`.

*Step 4.* Edit the generated `index.rst` file so that `mydoc.rst` is included, i.e., add `mydoc` to the `toctree` section so that it becomes

```
.. toctree::
 :maxdepth: 2

 mydoc
```

(The spaces before `mydoc` are important!)

*Step 5.* Generate, for instance, an HTML version of the Sphinx source:

```
make clean # remove old versions
make html
```

*Step 6.* View the result:

```
Terminal> firefox _build/html/index.html
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows `!bc:` `cod` gives Python (`code-block:: python` in Sphinx syntax) and `cppcod` gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

## 4.6 Google Code Wiki

There are several different wiki dialects, but Doconce only support the one used by [Google Code](#). The transformation to this format, called `gwiki` to explicitly mark it as the Google Code dialect, is done by

```
Terminal> doconce format gwiki mydoc.do.txt
```

You can then open a new wiki page for your Google Code project, copy the `mydoc.gwiki` output file from `doconce format` and paste the file contents into the wiki page. Press **Preview** or **Save Page** to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

## 4.7 Tweaking the Doconce Output

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the `.rst` file is going to be filtered to LaTeX or HTML, it cannot know if `.eps` or `.png` is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., `sed`, `perl`, `python`, or `scitools subst`, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The `make.sh` files in `docs/manual` and `docs/tutorial` constitute comprehensive examples on how such scripts can be made.

## 4.8 Demos

The current text is generated from a Doconce format stored in the file

```
docs/tutorial/tutorial.do.txt
```

The file `make.sh` in the `tutorial` directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, `tutorial.do.txt` is the starting point. Running `make.sh` and studying the various generated files and comparing them with the original `tutorial.do.txt` file, gives a quick introduction to how Doconce is used in a real case. [Here](#) is a sample of how this tutorial looks in different formats.

There is another demo in the `docs/manual` directory which translates the more comprehensive documentation, `manual.do.txt`, to various formats. The `make.sh` script runs a set of translations.

## 4.9 Dependencies

If you make use of preprocessor directives in the Doconce source, either [Preprocess](#) or [Mako](#) must be installed. To make LaTeX documents (without going through the reStructuredText format) you also need [ptex2tex](#) and some style files that `ptex2tex` potentially makes use of. Going from reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX requires [docutils](#). Making Sphinx documents requires of course [Sphinx](#). All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to [Pandoc](#) is desired, the Pandoc Haskell program must of course be installed.

# INDICES AND TABLES

- *genindex*
- *modindex*
- *search*

” **tutorial.txt** ”

Doconce: Document Once, Include Anywhere  
=====

Hans Petter Langtangen [1, 2]

[1] Simula Research Laboratory  
[2] University of Oslo

Date: Jan 5, 2012

- \* When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?
- \* Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like LaTeX (<http://refcards.com/docs/silvermanj/amslatex/LaTeXRefCard.v2.0.pdf>), HTML (<http://www.htmlcodetutorial.com/>), reStructuredText (<http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html>), Sphinx (<http://sphinx.pocoo.org/contents.html>), and wiki (<http://code.google.com/p/support/wiki/WikiSyntax>)? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?
- \* Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.

The Doconce Concept  
=====

Doconce is two things:

1. Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word.  
(An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)
2. Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy.

**tutorial.txt**

The slogan is: "Write once, include anywhere".

Here are some Doconce features:

- \* Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- \* Doconce can be converted to plain *\*untagged\** text, often desirable for computer programs and email.
- \* Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- \* Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- \* Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- \* Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- \* Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- \* Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- \* Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.



” **tutorial.txt** ”

What Does Doconce Look Like?

=====

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- \* Bullet lists arise from lines starting with an asterisk.
- \* *\*Emphasized words\** are surrounded by asterisks.
- \* Words in boldface are surrounded by underscores.
- \* Words from computer code are enclosed in back quotes and then typeset verbatim (in a monospace font).
- \* Section headings are recognized by equality (=) signs before and after the title, and the number of = signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
- \* Paragraph headings are recognized by a double underscore before and after the heading.
- \* The abstract of a document starts with *\*Abstract\** as paragraph heading, and all text up to the next heading makes up the abstract,
- \* Blocks of computer code can easily be included by placing !bc (begin code) and !ec (end code) commands at separate lines before and after the code block.
- \* Blocks of computer code can also be imported from source files.
- \* Blocks of LaTeX mathematics can easily be included by placing !bt (begin TeX) and !et (end TeX) commands at separate lines before and after the math block.
- \* There is support for both LaTeX and text-like inline mathematics.
- \* Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- \* Invisible comments in the output format can be inserted throughout the text (# at the beginning of a line).
- \* Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- \* There is special support for advanced exercises features.
- \* With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- \* With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format::

## tutorial.txt

```
==== A Subsection with Sample Text ====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for \_boldface\_ words, *\*emphasized\** words, and `'computer'` words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

Lists can also have automatically numbered items instead of bullets,

- o item 1
- o item 2
- o item 3

URLs with a link word are possible, as in "hpl":"http://folk.uio.no/hpl"

If the word is URL, the URL itself becomes the link name, as in "URL":"tutorial.do.txt".

References to sections may use logical names as labels (e.g., a "label" command right after the section title), as in the reference to Section ref{my:first:sec}.

Doconce also allows inline comments such as [hpl: here I will make some remarks to the text] for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section ref{doconce2formats} for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

# lines beginning with # are comment lines

The Doconce text above results in the following little document:

```
A Subsection with Sample Text

```

Ordinary text looks like ordinary text, and the tags used for \_boldface\_ words, *\*emphasized\** words, and computer words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

” **tutorial.txt** ”

Lists can also have numbered items instead of bullets, just use an o (for ordered) instead of the asterisk:

1. item 1
2. item 2
3. item 3

URLs with a link word are possible, as in hpl (<http://folk.uio.no/hpl>). If the word is URL, the URL itself becomes the link name, as in tutorial.do.txt.

References to sections may use logical names as labels (e.g., a "label" command right after the section title), as in the reference to the section "A Subsection with Sample Text".

Doconce also allows inline comments such as [hpl: here I will make some remarks to the text] for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see the section "From Doconce to Other Formats" for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

#### Mathematics and Computer Code

Inline mathematics, such as  $v = \sin(x)$ , allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like  $v = \sin(x)$  is typeset as::

$$\nu = \sin(x) \quad | \quad v = \sin(x)$$

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside !bt and !et (begin tex / end tex) instructions. The result looks like this::

```
\begin{eqnarray}
\{\partial u \over \partial t\} \&=& \nabla^2 u + f, \text{label}\{myeq1\} \\
\{\partial v \over \partial t\} \&=& \nabla \cdot (q(u) \nabla v) + g
\end{eqnarray}
```

Of course, such blocks only looks nice in LaTeX. The raw

**tutorial.txt**

LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `!bc` and `!ec` instructions, respectively. Such blocks look like::

```
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to sphinx, rst, and ASCII-close formats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `!bc xxx` where `xxx` is an identifier like `pycod` for code snippet in Python, `sys` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `ptex2tex` and defined in a configuration file `.ptext2tex.cfg`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments)::

```
sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
```

By default, `pro` and `cod` are `python`, `sys` is `console`, while `xpro` and `xcod` are computer language specific for `x` in `f` (Fortran), `c` (C), `cpp` (C++), `pl` (Perl), `m` (Matlab), `sh` (Unix shells), `cy` (Cython), and `py` (Python).

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `!bc pro`, while a part of a file is copied into a `!bc cod` environment. What `pro` and `cod` mean is then defined through a `.ptex2tex.cfg` file for LaTeX and a sphinx code-blocks comment for Sphinx.

Another document can be included by writing `#include "mynote.do.txt"` on a line starting with (another) hash sign. Doconce documents have extension `do.txt`. The `do` part stands for doconce, while the trailing `.txt` denotes a text document so that editors gives you the right writing enviroment for plain text.

Macros (Newcommands), Cross-References, Index, and Bibliography

-----

Doconce supports a type of macros via a LaTeX-style `*newcommand*` construction. The newcommands defined in a file with name `newcommand_replace.tex` are expanded when Doconce is filtered to

**tutorial.txt**

other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `newcommands.tex` and `newcommands_keep.tex` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `!bt` and `!et` in `newcommands_keep.tex` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `newcommands_replace.tex` and expanded by Doconce. The definitions of newcommands in the `newcommands*.tex` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `doc/manual/manual.do.txt` file (see the demo page (<https://doconce.googlecode.com/hg/doc/demos/manual/index.html>) for various formats of this document).

#### From Doconce to Other Formats

=====

Transformation of a Doconce document `mydoc.do.txt` to various other formats applies the script `doconce format`:

```
Terminal> doconce format format mydoc.do.txt
```

or just::

```
Terminal> doconce format format mydoc
```

The `mako` or `preprocess` programs are always used to preprocess the file first, and options to `mako` or `preprocess` can be added after the filename. For example::

```
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # mako
```

The variable `FORMAT` is always defined as the current format when running `preprocess`. That is, in the last example, `FORMAT` is defined as `latex`. Inside the Doconce document one can then perform

”

**tutorial.txt**

”

format specific actions through tests like `#if FORMAT == "latex"`.

Inline comments in the text are removed from the output by::

```
Terminal> doconce format latex mydoc --skip_inline_comments
```

One can also remove all such comments from the original Doconce file by running::

```
Terminal> doconce remove_inline_comments mydoc
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

**HTML**

----

Making an HTML version of a Doconce file `mydoc.do.txt` is performed by::

```
Terminal> doconce format html mydoc
```

The resulting file `mydoc.html` can be loaded into any web browser for viewing.

**LaTeX**

-----

Making a LaTeX file `mydoc.tex` from `mydoc.do.txt` is done in two steps:

\*Step 1.\* Filter the doconce text to a pre-LaTeX form `mydoc.p.tex` for `ptex2tex`::

```
Terminal> doconce format latex mydoc
```

LaTeX-specific commands ("newcommands") in math formulas and similar can be placed in files `newcommands.tex`, `newcommands_keep.tex`, or `newcommands_replace.tex` (see the section "Macros (Newcommands), Cross-References, Index, and Bibliography"). If these files are present, they are included in the LaTeX document so that your commands are defined.

\*Step 2.\* Run `ptex2tex` (if you have it) to make a standard LaTeX file::

```
Terminal> ptex2tex mydoc
```

or just perform a plain copy::

```
Terminal> cp mydoc.p.tex mydoc.tex
```

Doconce generates a `.p.tex` file with some preprocessor macros that can be used to steer certain properties of the LaTeX document. For example, to turn on the Helvetica font instead of the standard

”

”

”

” **tutorial.txt** ”

Computer Modern font, run::

```
Terminal> ptex2tex -DHELVETICA mydoc
```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX "maketitle" heading is also available through::

```
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
```

A separate titlepage can be generate by::

```
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
```

The ptex2tex tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any !bc command in the Doconce source you can insert verbatim block styles as defined in your .ptex2tex.cfg file, e.g., !bc cod for a code snippet, where cod is set to a certain environment in .ptex2tex.cfg (e.g., CodeIntended). There are over 30 styles to choose from.

\*Step 3.\* Compile mydoc.tex  
and create the PDF file::

```
Terminal> latex mydoc
Terminal> latex mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
```

If one wishes to use the Minted\_Python, Minted\_Cpp, etc., environments in ptex2tex for typesetting code, the minted LaTeX package is needed. This package is included by running doconce format with the -DMINTED option::

```
Terminal> ptex2tex -DMINTED mydoc
```

In this case, latex must be run with the  
-shell-escape option::

```
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc
```

The -shell-escape option is required because the minted.sty style file runs the pygments program to format code, and this program

” **tutorial.txt** ”

cannot be run from latex without the `-shell-escape` option.

#### Plain ASCII Text

-----

We can go from Doconce "back to" plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code::

```
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
```

#### reStructuredText

-----

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file mydoc.rst::

```
Terminal> doconce format rst mydoc.do.txt
```

We may now produce various other formats::

```
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
```

The OpenOffice file mydoc.odt can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

#### Sphinx

-----

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the doconce sphinx\_dir command::

```
Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinxdir \
 theme=mytheme file1 file2 file3 ...
```

The keywords author, title, and version are used in the headings of the Sphinx document. By default, version is 1.0 and the script will try to deduce authors and title from the doconce files file1, file2, etc. that together represent the whole document. Note that none of the individual Doconce files file1, file2, etc. should include the rest as their union makes up the whole document. The default value of dirname is sphinx-rootdir. The theme keyword is used to set the theme for design of HTML output from Sphinx (the default theme is 'default').

With a single-file document in mydoc.do.txt one often just runs::



” **tutorial.txt** ”

```
Terminal> doconce sphinx_dir mydoc
```

and then an appropriate Sphinx directory sphinx-rootdir is made with relevant files.

The doconce sphinx\_dir command generates a script automake-sphinx.sh for compiling the Sphinx document into an HTML document. This script copies directories named figs or figures over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, automake-sphinx.sh must be edited accordingly. One can either run automake-sphinx.sh or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the conf.py configuration file for Sphinx is edited accordingly, and a script make-themes.sh can make HTML documents with one or more themes. For example, to realize the themes fenics and pyramid, one writes::

```
Terminal> ./make-themes.sh fenics pyramid
```

The resulting directories with HTML documents are \_build/html\_fenics and \_build/html\_pyramid, respectively. Without arguments, make-themes.sh makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file mydoc.do.txt.

**\*Step 1.\*** Translate Doconce into the Sphinx dialect of the reStructuredText format::

```
Terminal> doconce format sphinx mydoc
```

**\*Step 2.\*** Create a Sphinx root directory with a conf.py file, either manually or by using the interactive sphinx-quickstart program. Here is a scripted version of the steps with the latter::

```
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
—
Name of My Sphinx Document
Author
version
version
.rst
index
n
y
n
```

” **tutorial.txt** ”

```
n
n
n
Y
n
n
Y
Y
Y
EOF
```

\*Step 3.\* Copy the tutorial.rst file to the Sphinx root directory::

```
Terminal> cp mydoc.rst sphinx-rootdir
```

If you have figures in your document, the relative paths to those will be invalid when you work with mydoc.rst in the sphinx-rootdir directory. Either edit mydoc.rst so that figure file paths are correct, or simply copy your figure directories to sphinx-rootdir.

\*Step 4.\* Edit the generated index.rst file so that mydoc.rst is included, i.e., add mydoc to the toctree section so that it becomes::

```
.. toctree::
 :maxdepth: 2

 mydoc
```

(The spaces before mydoc are important!)

\*Step 5.\* Generate, for instance, an HTML version of the Sphinx source::

```
make clean # remove old versions
make html
```

\*Step 6.\* View the result::

```
Terminal> firefox _build/html/index.html
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows !bc: cod gives Python (code-block:: python in Sphinx syntax) and cppcod gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

Google Code Wiki

-----

There are several different wiki dialects, but Doconce only support the one used by Google Code (<http://code.google.com/p/support/wiki/WikiSyntax>). The transformation to this format, called gwiki to explicitly mark it as the Google Code dialect, is done by::

## tutorial.txt

```
Terminal> doconce format gwiki mydoc.do.txt
```

You can then open a new wiki page for your Google Code project, copy the mydoc.gwiki output file from doconce format and paste the file contents into the wiki page. Press `_Preview_` or `_Save Page_` to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

### Tweaking the Doconce Output

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the .rst file is going to be filtered to LaTeX or HTML, it cannot know if .eps or .png is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., sed, perl, python, or scitools subst, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The make.sh files in docs/manual and docs/tutorial constitute comprehensive examples on how such scripts can be made.

### Demos

The current text is generated from a Doconce format stored in the file::

```
docs/tutorial/tutorial.do.txt
```

The file make.sh in the tutorial directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, tutorial.do.txt is the starting point. Running make.sh and studying the various generated files and comparing them with the original tutorial.do.txt file, gives a quick introduction to how Doconce is used in a real case. Here (<https://doconce.googlecode.com/hg/doc/demos/tutorial/index.html>) is a sample of how this tutorial looks in different formats.

There is another demo in the docs/manual directory which translates the more comprehensive documentation, manual.do.txt, to various formats. The make.sh script runs a set of translations.

### Dependencies

If you make use of preprocessor directives in the Doconce source, either Preprocess (<http://code.google.com/p/preprocess>) or Mako (<http://www.makotemplates.org>) must be installed. To make LaTeX documents (without going through the reStructuredText format) you also

”

**tutorial.txt**

”

need `ptex2tex` (<http://code.google.com/p/ptex2tex>) and some style files that `ptex2tex` potentially makes use of. Going from `reStructuredText` to formats such as XML, OpenOffice, HTML, and LaTeX requires `docutils` (<http://docutils.sourceforge.net>). Making Sphinx documents requires of course Sphinx (<http://sphinx.pocoo.org>). All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to Pandoc (<http://johnmacfarlane.net/pandoc/>) is desired, the Pandoc Haskell program must of course be installed.

” **tutorial.epytext** ”

TITLE: Doconce: Document Once, Include Anywhere  
 BY: Hans Petter Langtangen (Simula Research Laboratory, and University of Oslo)  
 ATE: today

- When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?
- Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like U{LaTeX<<http://refcards.com/docs/silvermanj/amslatex/LaTeXRefCard.v2.0.pdf>>}, U{HTML<<http://www.htmlcodetutorial.com/>>}, U{reStructuredText<<http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html>>}, U{Sphinx<<http://sphinx.pocoo.org/contents.html>>}, and U{wiki<<http://code.google.com/p/support/wiki/WikiSyntax>>}? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?
- Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.

### The Doconce Concept

=====

Doconce is two things:

1. Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word.  
 (An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)
2. Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy. The slogan is: "Write once, include anywhere".

Here are some Doconce features:

- Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- Doconce can be converted to plain I{untagged} text, often desirable for computer programs and email.

## tutorial.epytext

- Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

### What Does Doconce Look Like?

=====

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- Bullet lists arise from lines starting with an asterisk.
- I{Emphasized words} are surrounded by asterisks.
- B{Words in boldface} are surrounded by underscores.
- Words from computer code are enclosed in back quotes and then typeset C{verbatim (in a monospace font)}.
- Section headings are recognized by equality (C{=}) signs before and after the title, and the number of C{=} signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.

## tutorial.epytext

- Paragraph headings are recognized by a double underscore before and after the heading.
- The abstract of a document starts with `I{Abstract}` as paragraph heading, and all text up to the next heading makes up the abstract,
- Blocks of computer code can easily be included by placing `C{!bc}` (begin code) and `C{!ec}` (end code) commands at separate lines before and after the code block.
- Blocks of computer code can also be imported from source files.
- Blocks of LaTeX mathematics can easily be included by placing `C{!bt}` (begin TeX) and `C{!et}` (end TeX) commands at separate lines before and after the math block.
- There is support for both LaTeX and text-like inline mathematics.
- Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- Invisible comments in the output format can be inserted throughout the text (`C{#}` at the beginning of a line).
- Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- There is special support for advanced exercises features.
- With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format::

```
===== A Subsection with Sample Text =====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for `_boldface_` words, `*emphasized*` words, and `'computer'` words look natural in plain text. Lists are typeset as you would do in an email,

```
* item 1
* item 2
* item 3
```

Lists can also have automatically numbered items instead of bullets,

```
o item 1
o item 2
o item 3
```

URLs with a link word are possible, as in `"hpl":"http://folk.uio.no/hpl"`

If the word is URL, the URL itself becomes the link name, as in `"URL":"tutorial.do.txt"`.

References to sections may use logical names as labels (e.g., a `"label"` command right after the section title), as in the reference to Section `ref{my:first:sec}`.

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section `ref{doconce2formats}` for an example).

## tutorial.epytext

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

# lines beginning with # are comment lines

The Doconce text above results in the following little document:

A Subsection with Sample Text

Ordinary text looks like ordinary text, and the tags used for **B{boldface}** words, *I{emphasized}* words, and `C{computer}` words look natural in plain text. Lists are typeset as you would do in an email,

- item 1
- item 2
- item 3

Lists can also have numbered items instead of bullets, just use an `C{o}` (for ordered) instead of the asterisk:

1. item 1
2. item 2
3. item 3

URLs with a link word are possible, as in `U{hpl<http://folk.uio.no/hpl>}`. If the word is URL, the URL itself becomes the link name, as in `U{tutorial.do.txt<tutorial.do.txt>}`.

References to sections may use logical names as labels (e.g., a "label" command right after the section title), as in the reference to the section "A Subsection with Sample Text".

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see the section "From Doconce to Other Formats" for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

Mathematics and Computer Code



”

**tutorial.epytext**

”

Inline mathematics, such as  $M\{v = \sin(x)\}$ , allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like  $M\{v = \sin(x)\}$  is typeset as::

NOTE: A verbatim block has been removed because it causes problems for Epytext.

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `C{!bt}` and `C{!et}` (`begin tex / end tex`) instructions. The result looks like this::

NOTE: A verbatim block has been removed because it causes problems for Epytext.

Of course, such blocks only looks nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `C{!bc}` and `C{!ec}` instructions, respectively. Such blocks look like::

```
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to `C{sphinx}`, `C{rst}`, and ASCII-close formats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `C{!bc xxx}` where `C{xxx}` is an identifier like `C{pycod}` for code snippet in Python, `C{sys}` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `C{ptex2tex}` and defined in a configuration file `C{.ptext2tex.cfg}`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments)::

```
sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
```

By default, `C{pro}` and `C{cod}` are `C{python}`, `C{sys}` is `C{console}`, while `C{xpro}` and `C{xcod}` are computer language specific for `C{x}`

”

”

”

”

**tutorial.epytext**

”

in `C{f}` (Fortran), `C{c}` (C), `C{cpp}` (C++), `C{pl}` (Perl), `C{m}` (Matlab), `C{sh}` (Unix shells), `C{cy}` (Cython), and `C{py}` (Python).

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `C{!bc pro}`, while a part of a file is copied into a `C{!bc cod}` environment. What `C{pro}` and `C{cod}` mean is then defined through a `C{.ptex2tex.cfg}` file for LaTeX and a `C{sphinx code-blocks}` comment for Sphinx.

Another document can be included by writing `C{#include "mynote.do.txt"}` on a line starting with (another) hash sign. Doconce documents have extension `C{do.txt}`. The `C{do}` part stands for doconce, while the trailing `C{.txt}` denotes a text document so that editors gives you the right writing enviroment for plain text.

#### Macros (Newcommands), Cross-References, Index, and Bibliography

---

Doconce supports a type of macros via a LaTeX-style `I{newcommand}` construction. The newcommands defined in a file with name `C{newcommand_replace.tex}` are expanded when Doconce is filtered to other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `C{newcommands.tex}` and `C{newcommands_keep.tex}` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `C{!bt}` and `C{!et}` in `C{newcommands_keep.tex}` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `C{newcommands_replace.tex}` and expanded by Doconce. The definitions of newcommands in the `C{newcommands*.tex}` files `I{must}` appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `C{doc/manual/manual.do.txt}` file (see the `U{demo page<https://doconce.googlecode.com/hg/doc/demos/manual/index.html>}` for various formats of this document).

#### From Doconce to Other Formats

”

”

”

”

**tutorial.epytext**

”

=====

Transformation of a Doconce document C{mydoc.do.txt} to various other formats applies the script C{doconce format}::

```
Terminal> doconce format format mydoc.do.txt
```

or just::

```
Terminal> doconce format format mydoc
```

The C{mako} or C{preprocess} programs are always used to preprocess the file first, and options to C{mako} or C{preprocess} can be added after the filename. For example::

```
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
```

```
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # make
```

The variable C{FORMAT} is always defined as the current format when running C{preprocess}. That is, in the last example, C{FORMAT} is defined as C{latex}. Inside the Doconce document one can then perform format specific actions through tests like C{#if FORMAT == "latex"}.

Inline comments in the text are removed from the output by::

```
Terminal> doconce format latex mydoc --skip_inline_comments
```

One can also remove all such comments from the original Doconce file by running::

```
Terminal> doconce remove_inline_comments mydoc
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

**HTML**

----

Making an HTML version of a Doconce file C{mydoc.do.txt} is performed by::

```
Terminal> doconce format html mydoc
```

The resulting file C{mydoc.html} can be loaded into any web browser for viewing.

**LaTeX**

-----

Making a LaTeX file C{mydoc.tex} from C{mydoc.do.txt} is done in two steps:

”

”

”

## tutorial.epytext

I{Step 1.} Filter the doconce text to a pre-LaTeX form C{mydoc.p.tex} for C{ptex2tex}::

```
Terminal> doconce format latex mydoc
```

LaTeX-specific commands ("newcommands") in math formulas and similar can be placed in files C{newcommands.tex}, C{newcommands\_keep.tex}, or C{newcommands\_replace.tex} (see the section "Macros (Newcommands), Cross-References, Index, and Bibliography").

If these files are present, they are included in the LaTeX document so that your commands are defined.

I{Step 2.} Run C{ptex2tex} (if you have it) to make a standard LaTeX file::

```
Terminal> ptex2tex mydoc
```

or just perform a plain copy::

```
Terminal> cp mydoc.p.tex mydoc.tex
```

Doconce generates a C{.p.tex} file with some preprocessor macros that can be used to steer certain properties of the LaTeX document. For example, to turn on the Helvetica font instead of the standard Computer Modern font, run::

```
Terminal> ptex2tex -DHELVETICA mydoc
```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX "maketitle" heading is also available through::

```
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
```

A separate titlepage can be generate by::

```
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
```

The C{ptex2tex} tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any C{!bc} command in the Doconce source you can insert verbatim block styles as defined in your C{.ptex2tex.cfg} file, e.g., C{!bc cod} for a code snippet, where C{cod} is set to a certain environment in C{.ptex2tex.cfg} (e.g., C{CodeIntended}). There are over 30 styles to choose from.

I{Step 3.} Compile C{mydoc.tex} and create the PDF file::

```
Terminal> latex mydoc
Terminal> latex mydoc
```

## tutorial.epytext

```
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
```

If one wishes to use the `C{Minted_Python}`, `C{Minted_Cpp}`, etc., environments in `C{ptex2tex}` for typesetting code, the `C{minted}` LaTeX package is needed. This package is included by running `C{doconce format}` with the `C{-DMINTED}` option::

```
Terminal> ptex2tex -DMINTED mydoc
```

In this case, `C{latex}` must be run with the `C{-shell-escape}` option::

```
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc
```

The `C{-shell-escape}` option is required because the `C{minted.sty}` style file runs the `C{pygments}` program to format code, and this program cannot be run from `C{latex}` without the `C{-shell-escape}` option.

### Plain ASCII Text

-----

We can go from Doconce "back to" plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code::

```
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
```

### reStructuredText

-----

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file `C{mydoc.rst}`::

```
Terminal> doconce format rst mydoc.do.txt
```

We may now produce various other formats::

```
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
```

The OpenOffice file `C{mydoc.odt}` can be loaded into OpenOffice and

”

**tutorial.epytext**

”

saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

Sphinx

-----

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the `C{doconce sphinx_dir}` command::

```
Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinxdir \
 theme=mytheme file1 file2 file3 ...
```

The keywords `C{author}`, `C{title}`, and `C{version}` are used in the headings of the Sphinx document. By default, `C{version}` is 1.0 and the script will try to deduce authors and title from the doconce files `C{file1}`, `C{file2}`, etc. that together represent the whole document. Note that none of the individual Doconce files `C{file1}`, `C{file2}`, etc. should include the rest as their union makes up the whole document. The default value of `C{dirname}` is `C{sphinx-rootdir}`. The `C{theme}` keyword is used to set the theme for design of HTML output from Sphinx (the default theme is `C{'default'}`).

With a single-file document in `C{mydoc.do.txt}` one often just runs::

```
Terminal> doconce sphinx_dir mydoc
```

and then an appropriate Sphinx directory `C{sphinx-rootdir}` is made with relevant files.

The `C{doconce sphinx_dir}` command generates a script `C{automake-sphinx.sh}` for compiling the Sphinx document into an HTML document. This script copies directories named `C{figs}` or `C{figures}` over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, `C{automake-sphinx.sh}` must be edited accordingly. One can either run `C{automake-sphinx.sh}` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `C{conf.py}` configuration file for Sphinx is edited accordingly, and a script `C{make-themes.sh}` can make HTML documents with one or more themes. For example, to realize the themes `C{fenics}` and `C{pyramid}`, one writes::

```
Terminal> ./make-themes.sh fenics pyramid
```

The resulting directories with HTML documents are `C{_build/html_fenics}` and `C{_build/html_pyramid}`, respectively. Without arguments, `C{make-themes.sh}` makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file `C{mydoc.do.txt}`.

”

”

”

”

**tutorial.epytext**

”

I{Step 1.} Translate Doconce into the Sphinx dialect of the reStructuredText format::

```
Terminal> doconce format sphinx mydoc
```

I{Step 2.} Create a Sphinx root directory with a C{conf.py} file, either manually or by using the interactive C{sphinx-quickstart} program. Here is a scripted version of the steps with the latter::

```
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
—
Name of My Sphinx Document
Author
version
version
.rst
index
n
Y
n
n
n
n
Y
n
n
Y
Y
Y
EOF
```

I{Step 3.} Copy the C{tutorial.rst} file to the Sphinx root directory::

```
Terminal> cp mydoc.rst sphinx-rootdir
```

If you have figures in your document, the relative paths to those will be invalid when you work with C{mydoc.rst} in the C{sphinx-rootdir} directory. Either edit C{mydoc.rst} so that figure file paths are correct, or simply copy your figure directories to C{sphinx-rootdir}.

I{Step 4.} Edit the generated C{index.rst} file so that C{mydoc.rst} is included, i.e., add C{mydoc} to the C{toctree} section so that it becomes::

```
.. toctree::
 :maxdepth: 2

 mydoc
```

(The spaces before C{mydoc} are important!)

”

”

”

”

**tutorial.epytext**

”

I{Step 5.} Generate, for instance, an HTML version of the Sphinx source::

```
make clean # remove old versions
make html
```

I{Step 6.} View the result::

```
Terminal> firefox _build/html/index.html
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows C{!bc}: C{cod} gives Python (C{code-block:: python} in Sphinx syntax) and C{cppcod} gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

Google Code Wiki

-----

There are several different wiki dialects, but Doconce only support the one used by U{Google Code<<http://code.google.com/p/support/wiki/WikiSyntax>>}. The transformation to this format, called C{gwiki} to explicitly mark it as the Google Code dialect, is done by::

```
Terminal> doconce format gwiki mydoc.do.txt
```

You can then open a new wiki page for your Google Code project, copy the C{mydoc.gwiki} output file from C{doconce format} and paste the file contents into the wiki page. Press B{Preview} or B{Save Page} to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

Tweaking the Doconce Output

-----

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the C{.rst} file is going to be filtered to LaTeX or HTML, it cannot know if C{.eps} or C{.png} is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., sed, perl, python, or scitools subst, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The C{make.sh} files in C{docs/manual} and C{docs/tutorial} constitute comprehensive examples on how such scripts can be made.

Demos

-----



## tutorial.epytext

The current text is generated from a Doconce format stored in the file::

```
docs/tutorial/tutorial.do.txt
```

The file C{make.sh} in the C{tutorial} directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, C{tutorial.do.txt} is the starting point. Running C{make.sh} and studying the various generated files and comparing them with the original C{tutorial.do.txt} file, gives a quick introduction to how Doconce is used in a real case. U{Here<<https://doconce.googlecode.com/hg/doc/demos/tutorial/index.html>>} is a sample of how this tutorial looks in different formats.

There is another demo in the C{docs/manual} directory which translates the more comprehensive documentation, C{manual.do.txt}, to various formats. The C{make.sh} script runs a set of translations.

### Dependencies

-----

If you make use of preprocessor directives in the Doconce source, either U{Preprocess<<http://code.google.com/p/preprocess/>>} or U{Mako<<http://www.makotemplates.org/>>} must be installed. To make LaTeX documents (without going through the reStructuredText format) you also need U{ptex2tex<<http://code.google.com/p/ptex2tex/>>} and some style files that C{ptex2tex} potentially makes use of. Going from reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX requires U{docutils<<http://docutils.sourceforge.net/>>}. Making Sphinx documents requires of course U{Sphinx<<http://sphinx.pocoo.org/>>}. All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to U{Pandoc<<http://johnmacfarlane.net/pandoc/>>} is desired, the Pandoc Haskell program must of course be installed.

## tutorial.gwiki

#summary Doconce: Document Once, Include Anywhere  
 <wiki:toc max\_depth="2" />  
 By \*Hans Petter Langtangen\*

==== Jan 5, 2012 ====

\* When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?

\* Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like [<http://refcards.com/docs/silvermanj/amslatex/LaTeXRefCard.v2.0.pdf> LaTeX], [<http://www.htmlcodetutorial.com/> HTML], [<http://docutils.sourceforge.net/docs/ref/rst/restructuredtext.html> reStructuredText], [<http://sphinx.pocoo.org/contents.html> Sphinx], and [[http://code.google.com/p/support/wiki/WikiSyntax\\_wiki](http://code.google.com/p/support/wiki/WikiSyntax_wiki)]? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?

\* Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.

== The Doconce Concept ==

Doconce is two things:

# Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word. (An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)

# Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language supports this working strategy. The slogan is: "Write once, include anywhere".

Here are some Doconce features:

\* Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.

\* Doconce can be converted to plain \*untagged\* text, often desirable for computer programs and email.

\* Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.

\* Doconce has full support for LaTeX math, and integrates very well with bi

## tutorial.gwiki

g LaTeX projects (books).

- \* Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.

- \* Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- \* Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.

- \* Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.

- \* Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

== What Does Doconce Look Like? ==

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- \* Bullet lists arise from lines starting with an asterisk.
- \* *\*Emphasized words\** are surrounded by asterisks.
- \* **\*Words in boldface\*** are surrounded by underscores.
- \* Words from computer code are enclosed in back quotes and then typeset `'ve rbatim` (in a monospace font)'.
  - \* Section headings are recognized by equality (`'='`) signs before and after the title, and the number of `'='` signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
  - \* Paragraph headings are recognized by a double underscore before and after the heading.
  - \* The abstract of a document starts with *\*Abstract\** as paragraph heading, a

## tutorial.gwiki

nd all text up to the next heading makes up the abstract,

- \* Blocks of computer code can easily be included by placing  `'!bc'`  (begin code) and  `'!ec'`  (end code) commands at separate lines before and after the code block.
- \* Blocks of computer code can also be imported from source files.
- \* Blocks of LaTeX mathematics can easily be included by placing  `'!bt'`  (begin TeX) and  `'!et'`  (end TeX) commands at separate lines before and after the math block.
- \* There is support for both LaTeX and text-like inline mathematics.
- \* Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- \* Invisible comments in the output format can be inserted throughout the text ( `'#'`  at the beginning of a line).
- \* Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- \* There is special support for advanced exercises features.
- \* With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- \* With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format:

```
{{{
===== A Subsection with Sample Text =====
label{my:first:sec}
```

Ordinary text looks like ordinary text, and the tags used for  `_boldface_`  words,  `*emphasized*`  words, and  `'computer'`  words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

Lists can also have automatically numbered items instead of bullets,

- o item 1
- o item 2
- o item 3

URLs with a link word are possible, as in  `"hpl": "http://folk.uio.no/hpl"` . If the word is URL, the URL itself becomes the link name, as in  `"URL": "tutorial.do.txt"` .

References to sections may use logical names as labels (e.g., a  `"label"`  command right after the section title), as in the reference to  `Section ref{my:first:sec}` .

Doconce also allows inline comments such as  `[hpl: here I will make some remarks to the text]`  for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see  `Section ref{doconce2formats}`  for an example).

Tables are also supported, e.g.,

|      |          |              |
|------|----------|--------------|
| time | velocity | acceleration |
| ---  | ---      | ---          |

## tutorial.gwiki

|     |          |           |
|-----|----------|-----------|
| 0.0 | 1.4186   | -5.01     |
| 2.0 | 1.376512 | 11.919    |
| 4.0 | 1.1E+1   | 14.717624 |

# lines beginning with # are comment lines  
 }}}

The Doconce text above results in the following little document:

==== A Subsection with Sample Text ====

Ordinary text looks like ordinary text, and the tags used for *\*boldface\** words, *\*emphasized\** words, and `'computer'` words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

Lists can also have numbered items instead of bullets, just use an `'o'` (for ordered) instead of the asterisk:

- # item 1
- # item 2
- # item 3

URLs with a link word are possible, as in `[http://folk.uio.no/hpl hpl]`. If the word is URL, the URL itself becomes the link name, as in `tutorial.do.txt`.

References to sections may use logical names as labels (e.g., a `"label"` command right after the section title), as in the reference to the section `[#A_Subsection_with_Sample_Text]`.

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see the section `[#From_Doconce_to_Other_Formats]` for an example).

Tables are also supported, e.g.,

| <i>*time*</i> | <i>*velocity*</i> | <i>*acceleration*</i> |
|---------------|-------------------|-----------------------|
| 0.0           | 1.4186            | -5.01                 |
| 2.0           | 1.376512          | 11.919                |
| 4.0           | 1.1E+1            | 14.717624             |

==== Mathematics and Computer Code ====

Inline mathematics, such as `'v = sin(x)'`, allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like `'v = sin(x)'` is typeset as

```
{
{
$ \nu = \sin(x) $ | $ v = \sin(x) $
```

## tutorial.gwiki

```
}}}
```

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `'!bt'` and `'!et'` (`begin tex / end tex`) instructions.

The result looks like this:

```
{
\begin{eqnarray}
{\partial u \over \partial t} &=& \nabla^2 u + f, \text{label{myeq1}} \\
{\partial v \over \partial t} &=& \nabla \cdot (q(u) \nabla v) + g
\end{eqnarray}
}
```

Of course, such blocks only looks nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `'!bc'` and `'!ec'` instructions, respectively. Such blocks look like

```
{
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
}
```

A code block must come after some plain sentence (at least for successful output to `'sphinx'`, `'rst'`, and ASCII-close formats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `'!bc xxx'` where `'xxx'` is an identifier like `'pycod'` for code snippet in Python, `'sys'` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `'ptex2tex'` and defined in a configuration file `'.ptext2tex.cfg'`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

```
{
sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
}
```

By default, `'pro'` and `'cod'` are `'python'`, `'sys'` is `'console'`, while `'xpro'` and `'xcod'` are computer language specific for `'x'` in `'f'` (Fortran), `'c'` (C), `'cpp'` (C++), `'pl'` (Perl), `'m'` (Matlab), `'sh'` (Unix shells), `'cy'` (Cython), and `'py'` (Python).

<wiki:comment> (Any sphinx code-block comment, whether inside verbatim code </wiki:comment>

<wiki:comment> blocks or outside, yields a mapping between bc arguments </wiki:comment>

<wiki:comment> and computer languages. In case of multiple definitions, the </wiki:comment>

<wiki:comment> first one is used.) </wiki:comment>

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of

## tutorial.gwiki

avoiding copying information!). A complete file is typeset with `'!bc pro'`, while a part of a file is copied into a `'!bc cod'` environment. What `'pro'` and `'cod'` mean is then defined through a `'.ptex2tex.cfg'` file for LaTeX and a `'sphinx code-blocks'` comment for Sphinx.

Another document can be included by writing `'#include "mynote.do.txt"'` on a line starting with (another) hash sign. Doconce documents have extension `'do.txt'`. The `'do'` part stands for doconce, while the trailing `'.txt'` denotes a text document so that editors gives you the right writing enviroment for plain text.

==== Macros (Newcommands), Cross-References, Index, and Bibliography ====

Doconce supports a type of macros via a LaTeX-style `*newcommand*` construction. The newcommands defined in a file with name `'newcommand_replace.tex'` are expanded when Doconce is filtered to other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `'newcommands.tex'` and `'newcommands_keep.tex'` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `'!bt'` and `'!et'` in `'newcommands_keep.tex'` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `'newcommands_replace.tex'` and expanded by Doconce. The definitions of newcommands in the `'newcommands*.tex'` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `'doc/manual/manual.do.txt'` file (see the [<https://doconce.googlecode.com/hg/doc/demos/manual/index.html> demo page] for various formats of this document).

<wiki:comment> Example on including another Doconce file (using preprocess): </wiki:comment>

== From Doconce to Other Formats ==

Transformation of a Doconce document `'mydoc.do.txt'` to various other formats applies the script `'doconce format'`:

```

{{{
Terminal> doconce format format mydoc.do.txt
}}}
```

” **tutorial.gwiki** ”

or just

```
{{{
Terminal> doconce format format mydoc
}}}
```

The 'mako' or 'preprocess' programs are always used to preprocess the file first, and options to 'mako' or 'preprocess' can be added after the filename. For example,

```
{{{
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # mako
}}}
```

The variable 'FORMAT' is always defined as the current format when running 'preprocess'. That is, in the last example, 'FORMAT' is defined as 'latex'. Inside the Doconce document one can then perform format specific actions through tests like '#if FORMAT == "latex"'.

Inline comments in the text are removed from the output by

```
{{{
Terminal> doconce format latex mydoc --skip_inline_comments
}}}
```

One can also remove all such comments from the original Doconce file by running:

```
{{{
Terminal> doconce remove_inline_comments mydoc
}}}
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

==== HTML ====

Making an HTML version of a Doconce file 'mydoc.do.txt' is performed by

```
{{{
Terminal> doconce format html mydoc
}}}
```

The resulting file 'mydoc.html' can be loaded into any web browser for viewing.

==== LaTeX ====

Making a LaTeX file 'mydoc.tex' from 'mydoc.do.txt' is done in two steps:

<wiki:comment> Note: putting code blocks inside a list is not successful in many  
</wiki:comment>  
<wiki:comment> formats - the text may be messed up. A better choice is a paragraph  
</wiki:comment>  
<wiki:comment> environment, as used here. </wiki:comment>

\*Step 1.\* Filter the doconce text to a pre-LaTeX form 'mydoc.p.tex' for 'ptex2tex':

```
{{{
Terminal> doconce format latex mydoc
}}}
```

LaTeX-specific commands ("newcommands") in math formulas and similar can be placed in files 'newcommands.tex', 'newcommands\_keep.tex', or 'newcommands\_replace.tex' (see the section [Macros\_(Newcommands),\_Cross-References,\_Index,\_and\_Bibliography]).

If these files are present, they are included in the LaTeX document so that your commands are defined.

\*Step 2.\* Run 'ptex2tex' (if you have it) to make a standard LaTeX file,



## tutorial.gwiki

```

{{{
Terminal> ptex2tex mydoc
}}}
or just perform a plain copy,
{{{
Terminal> cp mydoc.p.tex mydoc.tex
}}}
Doconce generates a '.p.tex' file with some preprocessor macros
that can be used to steer certain properties of the LaTeX document.
For example, to turn on the Helvetica font instead of the standard
Computer Modern font, run

```

```

{{{
Terminal> ptex2tex -DHELVETICA mydoc
}}}

```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX "maketitle" heading is also available through

```

{{{
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
}}}

```

A separate titlepage can be generate by

```

{{{
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
}}}

```

The 'ptex2tex' tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any '!bc' command in the Doconce source you can insert verbatim block styles as defined in your '.ptex2tex.cfg' file, e.g., '!bc cod' for a code snippet, where 'cod' is set to a certain environment in '.ptex2tex.cfg' (e.g., 'CodeIntended'). There are over 30 styles to choose from.

\*Step 3.\* Compile 'mydoc.tex' and create the PDF file:

```

{{{
Terminal> latex mydoc
Terminal> latex mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
}}}

```

If one wishes to use the 'Minted\_Python', 'Minted\_Cpp', etc., environments in 'ptex2tex' for typesetting code, the 'minted' LaTeX package is needed. This package is included by running 'doconce format' with the '-DMINTED' option:

```

{{{
Terminal> ptex2tex -DMINTED mydoc
}}}

```

In this case, 'latex' must be run with the '-shell-escape' option:

```

{{{
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
}}}

```

## tutorial.gwiki

```
Terminal> dvipdf mydoc
```

```
}}}
The '-shell-escape' option is required because the 'minted.sty' style
file runs the 'pygments' program to format code, and this program
cannot be run from 'latex' without the '-shell-escape' option.
```

```
==== Plain ASCII Text ====
```

We can go from Doconce "back to" plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code:

```
{{{
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
}}}
```

```
==== reStructuredText ====
```

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file 'mydoc.rst':

```
{{{
Terminal> doconce format rst mydoc.do.txt
}}}
```

We may now produce various other formats:

```
{{{
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
}}}
```

The OpenOffice file 'mydoc.odt' can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

```
==== Sphinx ====
```

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the 'doconce sphinx\_dir' command:

```
{{{
Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinx_dir \
 theme=mytheme file1 file2 file3 ...
}}}
```

The keywords 'author', 'title', and 'version' are used in the headings of the Sphinx document. By default, 'version' is 1.0 and the script will try to deduce authors and title from the doconce files 'file1', 'file2', etc. that together represent the whole document. Note that none of the individual Doconce files 'file1', 'file2', etc. should include the rest as their union makes up the whole document. The default value of 'dirname' is 'sphinx-rootdir'. The 'theme' keyword is used to set the theme for design of HTML output from Sphinx (the default theme is 'default').

With a single-file document in 'mydoc.do.txt' one often just runs

```
{{{
Terminal> doconce sphinx_dir mydoc
}}}
```

and then an appropriate Sphinx directory 'sphinx-rootdir' is made with relevant files.

” **tutorial.gwiki** ”

The `'doconce sphinx_dir'` command generates a script `'automake-sphinx.sh'` for compiling the Sphinx document into an HTML document. This script copies directories named `'figs'` or `'figures'` over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, `'automake-sphinx.sh'` must be edited accordingly. One can either run `'automake-sphinx.sh'` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `'conf.py'` configuration file for Sphinx is edited accordingly, and a script `'make-themes.sh'` can make HTML documents with one or more themes. For example,

to realize the themes `'fenics'` and `'pyramid'`, one writes

```

{{{
Terminal> ./make-themes.sh fenics pyramid
}}}
```

The resulting directories with HTML documents are `'_build/html_fenics'` and `'_build/html_pyramid'`, respectively. Without arguments, `'make-themes.sh'` makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file `'mydoc.do.txt'`.

**\*Step 1.\*** Translate Doconce into the Sphinx dialect of the reStructuredText format:

```

{{{
Terminal> doconce format sphinx mydoc
}}}
```

**\*Step 2.\*** Create a Sphinx root directory with a `'conf.py'` file, either manually or by using the interactive `'sphinx-quickstart'` program. Here is a scripted version of the steps with the latter:

```

{{{
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
—
Name of My Sphinx Document
Author
version
version
.rst
index
n
y
n
n
n
n
y
n
n
y
y
Y
Y
}}}
```

## tutorial.gwiki

```
Y
EOF
}}}
```

\*Step 3.\* Copy the 'tutorial.rst' file to the Sphinx root directory:

```
{
{
Terminal> cp mydoc.rst sphinx-rootdir
}}
```

If you have figures in your document, the relative paths to those will be invalid when you work with 'mydoc.rst' in the 'sphinx-rootdir' directory. Either edit 'mydoc.rst' so that figure file paths are correct, or simply copy your figure directories to 'sphinx-rootdir'.

\*Step 4.\* Edit the generated 'index.rst' file so that 'mydoc.rst' is included, i.e., add 'mydoc' to the 'toctree' section so that it becomes

```
{
{
.. toctree::
 :maxdepth: 2
```

```

 mydoc
}}
```

(The spaces before 'mydoc' are important!)

\*Step 5.\* Generate, for instance, an HTML version of the Sphinx source:

```
{
{
make clean # remove old versions
make html
}}
```

\*Step 6.\* View the result:

```
{
{
Terminal> firefox _build/html/index.html
}}
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows '!bc': 'cod' gives Python ('code-block:: python' in Sphinx syntax) and 'cppcod' gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

==== Google Code Wiki ====

There are several different wiki dialects, but Doconce only support the one used by [<http://code.google.com/p/support/wiki/WikiSyntax> Google Code]. The transformation to this format, called 'gwiki' to explicitly mark it as the Google Code dialect, is done by

```
{
{
Terminal> doconce format gwiki mydoc.do.txt
}}
```

You can then open a new wiki page for your Google Code project, copy the 'mydoc.gwiki' output file from 'doconce format' and paste the file contents into the wiki page. Press \*Preview\* or \*Save Page\* to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

==== Tweaking the Doconce Output ====

## tutorial.gwiki

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the '.rst' file is going to be filtered to LaTeX or HTML, it cannot know if '.eps' or '.png' is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., sed, perl, python, or scitools subst, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The 'make.sh' files in 'docs/manual' and 'docs/tutorial' constitute comprehensive examples on how such scripts can be made.

==== Demos ====

The current text is generated from a Doconce format stored in the file

```
{
docs/tutorial/tutorial.do.txt
}
```

The file 'make.sh' in the 'tutorial' directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, 'tutorial.do.txt' is the starting point. Running 'make.sh' and studying the various generated files and comparing them with the original 'tutorial.do.txt' file, gives a quick introduction to how Doconce is used in a real case. [<https://doconce.googlecode.com/hg/doc/demos/tutorial/index.html> Here] is a sample of how this tutorial looks in different formats.

There is another demo in the 'docs/manual' directory which translates the more comprehensive documentation, 'manual.do.txt', to various formats. The 'make.sh' script runs a set of translations.

==== Dependencies ====

If you make use of preprocessor directives in the Doconce source, either [<http://code.google.com/p/preprocess> Preprocess] or [<http://www.makotemplates.org> Mako] must be installed. To make LaTeX documents (without going through the reStructuredText format) you also need [<http://code.google.com/p/ptex2tex> ptex2tex] and some style files that 'ptex2tex' potentially makes use of. Going from reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX requires [<http://docutils.sourceforge.net> docutils]. Making Sphinx documents requires of course [<http://sphinx.pocoo.org> Sphinx]. All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to [<http://johnmacfarlane.net/pandoc/> Pandoc] is desired, the Pandoc Haskell program must of course be installed.

---

# **Doconce: Document Once, Include Anywhere Documentation**

***Release 1.0***

**Hans Petter Langtangen**

January 05, 2012



# CONTENTS

|          |                                                                           |           |
|----------|---------------------------------------------------------------------------|-----------|
| <b>1</b> | <b>Doconce: Document Once, Include Anywhere</b>                           | <b>3</b>  |
| <b>2</b> | <b>The Doconce Concept</b>                                                | <b>5</b>  |
| <b>3</b> | <b>What Does Doconce Look Like?</b>                                       | <b>7</b>  |
| 3.1      | A Subsection with Sample Text . . . . .                                   | 8         |
| 3.2      | Mathematics and Computer Code . . . . .                                   | 9         |
| 3.3      | Macros (Newcommands), Cross-References, Index, and Bibliography . . . . . | 10        |
| <b>4</b> | <b>From Doconce to Other Formats</b>                                      | <b>11</b> |
| 4.1      | HTML . . . . .                                                            | 11        |
| 4.2      | LaTeX . . . . .                                                           | 12        |
| 4.3      | Plain ASCII Text . . . . .                                                | 13        |
| 4.4      | reStructuredText . . . . .                                                | 13        |
| 4.5      | Sphinx . . . . .                                                          | 13        |
| 4.6      | Google Code Wiki . . . . .                                                | 15        |
| 4.7      | Tweaking the Doconce Output . . . . .                                     | 15        |
| 4.8      | Demos . . . . .                                                           | 15        |
| 4.9      | Dependencies . . . . .                                                    | 16        |
| <b>5</b> | <b>Indices and tables</b>                                                 | <b>17</b> |





Contents:



# DOCONCE: DOCUMENT ONCE, INCLUDE ANYWHERE

**Author** Hans Petter Langtangen

**Date** Jan 5, 2012

- When writing a note, report, manual, etc., do you find it difficult to choose the typesetting format? That is, to choose between plain (email-like) text, wiki, Word/OpenOffice, LaTeX, HTML, reStructuredText, Sphinx, XML, etc. Would it be convenient to start with some very simple text-like format that easily converts to the formats listed above, and then at some later stage eventually go with a particular format?
- Do you need to write documents in varying formats but find it difficult to remember all the typesetting details of various formats like LaTeX, HTML, reStructuredText, Sphinx, and wiki? Would it be convenient to generate the typesetting details of a particular format from a very simple text-like format with minimal tagging?
- Do you have the same information scattered around in different documents in different typesetting formats? Would it be a good idea to write things once, in one format, stored in one place, and include it anywhere?

If any of these questions are of interest, you should keep on reading.



# THE DOCONCE CONCEPT

Doconce is two things:

1. Doconce is a very simple and minimally tagged markup language that looks like ordinary ASCII text (much like what you would use in an email), but the text can be transformed to numerous other formats, including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx, Epytext, and also plain text (where non-obvious formatting/tags are removed for clear reading in, e.g., emails). From reStructuredText you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the latter to RTF and MS Word. (An experimental translator to Pandoc is under development, and from Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML, OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)
2. Doconce is a working strategy for never duplicating information. Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy. The slogan is: “Write once, include anywhere”.

Here are some Doconce features:

- Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- Doconce can be converted to plain *untagged* text, often desirable for computer programs and email.
- Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.

Doconce was particularly written for the following sample applications:

- Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.

History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.

Disclaimer: Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

# WHAT DOES DOCONCE LOOK LIKE?

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

- Bullet lists arise from lines starting with an asterisk.
- *Emphasized words* are surrounded by asterisks.
- **Words in boldface** are surrounded by underscores.
- Words from computer code are enclosed in back quotes and then typeset `verbatim` (in a monospace font).
- Section headings are recognized by equality (=) signs before and after the title, and the number of = signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.
- Paragraph headings are recognized by a double underscore before and after the heading.
- The abstract of a document starts with *Abstract* as paragraph heading, and all text up to the next heading makes up the abstract.
- Blocks of computer code can easily be included by placing `!bc` (begin code) and `!ec` (end code) commands at separate lines before and after the code block.
- Blocks of computer code can also be imported from source files.
- Blocks of LaTeX mathematics can easily be included by placing `!bt` (begin TeX) and `!et` (end TeX) commands at separate lines before and after the math block.
- There is support for both LaTeX and text-like inline mathematics.
- Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.
- Invisible comments in the output format can be inserted throughout the text (# at the beginning of a line).
- Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).
- There is special support for advanced exercises features.
- With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.
- With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.

Here is an example of some simple text written in the Doconce format:

```
===== A Subsection with Sample Text =====
label{my:first:sec}
```



Ordinary text looks like ordinary text, and the tags used for `_boldface_` words, `*emphasized*` words, and ``computer`` words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

Lists can also have automatically numbered items instead of bullets,

- o item 1
- o item 2
- o item 3

URLs with a link word are possible, as in `"hpl":"http://folk.uio.no/hpl"`. If the word is URL, the URL itself becomes the link name, as in `"URL":"tutorial.do.txt"`.

References to sections may use logical names as labels (e.g., a `"label"` command right after the section title), as in the reference to `Section ref{my:first:sec}`.

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see `Section ref{doconce2formats}` for an example).

Tables are also supported, e.g.,

```
|-----|
|time | velocity | acceleration |
|---r---r-----r-----|
| 0.0 | 1.4186 | -5.01 |
| 2.0 | 1.376512 | 11.919 |
| 4.0 | 1.1E+1 | 14.717624 |
|-----|
```

# lines beginning with # are comment lines

The Doconce text above results in the following little document:

### 3.1 A Subsection with Sample Text

Ordinary text looks like ordinary text, and the tags used for **boldface** words, *emphasized* words, and `computer` words look natural in plain text. Lists are typeset as you would do in an email,

- item 1
- item 2
- item 3

Lists can also have numbered items instead of bullets, just use an `o` (for ordered) instead of the asterisk:

1. item 1
2. item 2
3. item 3

URLs with a link word are possible, as in [hpl](#). If the word is URL, the URL itself becomes the link name, as in [tutorial.do.txt](#).

References to sections may use logical names as labels (e.g., a “label” command right after the section title), as in the reference to the section [A Subsection with Sample Text](#).

Doconce also allows inline comments such as (**hpl**: here I will make some remarks to the text) for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see the section [From Doconce to Other Formats](#) for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

## 3.2 Mathematics and Computer Code

Inline mathematics, such as  $\nu = \sin(x)$ , allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like  $\nu = \sin(x)$  is typeset as

`$\nu = \sin(x)$` | `$v = \sin(x)$`

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `!bt` and `!et` (begin tex / end tex) instructions. The result looks like this:

$$\begin{aligned}\frac{\partial u}{\partial t} &= \nabla^2 u + f, \\ \frac{\partial v}{\partial t} &= \nabla \cdot (q(u) \nabla v) + g\end{aligned}\tag{3.1}$$

Of course, such blocks only looks nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `!bc` and `!ec` instructions, respectively. Such blocks look like

```
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to `sphinx`, `rst`, and ASCII-close formats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `!bc xxx` where `xxx` is an identifier like `pycod` for code snippet in Python, `sys` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `ptex2tex` and defined in a configuration file `.ptext2tex.cfg`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

```
sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console
```

By default, `pro` and `cod` are `python`, `sys` is `console`, while `xpro` and `xcod` are computer language specific for `x` in `f` (Fortran), `c` (C), `cpp` (C++), `pl` (Perl), `m` (Matlab), `sh` (Unix shells), `cy` (Cython), and `py` (Python).

One can also copy computer code directly from files, either the complete file or specified parts. Computer code is then never duplicated in the documentation (important for the principle of avoiding copying information!). A complete file is typeset with `!bc pro`, while a part of a file is copied into a `!bc cod` environment. What `pro` and `cod` mean is then defined through a `.ptex2tex.cfg` file for LaTeX and a `sphinx code-blocks` comment for Sphinx.

Another document can be included by writing `#include "mynote.do.txt"` on a line starting with (another) hash sign. Doconce documents have extension `do.txt`. The `do` part stands for doconce, while the trailing `.txt` denotes a text document so that editors gives you the right writing enviroment for plain text.

### 3.3 Macros (Newcommands), Cross-References, Index, and Bibliography

Doconce supports a type of macros via a LaTeX-style *newcommand* construction. The newcommands defined in a file with name `newcommand_replace.tex` are expanded when Doconce is filtered to other formats, except for LaTeX (since LaTeX performs the expansion itself). Newcommands in files with names `newcommands.tex` and `newcommands_keep.tex` are kept unaltered when Doconce text is filtered to other formats, except for the Sphinx format. Since Sphinx understands LaTeX math, but not newcommands if the Sphinx output is HTML, it makes most sense to expand all newcommands. Normally, a user will put all newcommands that appear in math blocks surrounded by `!bt` and `!et` in `newcommands_keep.tex` to keep them unchanged, at least if they contribute to make the raw LaTeX math text easier to read in the formats that cannot render LaTeX. Newcommands used elsewhere throughout the text will usually be placed in `newcommands_replace.tex` and expanded by Doconce. The definitions of newcommands in the `newcommands*.tex` files *must* appear on a single line (multi-line newcommands are too hard to parse with regular expressions).

Recent versions of Doconce also offer cross referencing, typically one can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `doc/manual/manual.do.txt` file (see the [demo page](#) for various formats of this document).

# FROM DOCONCE TO OTHER FORMATS

Transformation of a Doconce document `mydoc.do.txt` to various other formats applies the script `doconce` format:

```
Terminal> doconce format format mydoc.do.txt
```

or just

```
Terminal> doconce format format mydoc
```

The `mako` or `preprocess` programs are always used to preprocess the file first, and options to `mako` or `preprocess` can be added after the filename. For example,

```
Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # mako
```

The variable `FORMAT` is always defined as the current format when running `preprocess`. That is, in the last example, `FORMAT` is defined as `latex`. Inside the Doconce document one can then perform format specific actions through tests like `#if FORMAT == "latex"`.

Inline comments in the text are removed from the output by

```
Terminal> doconce format latex mydoc --skip_inline_comments
```

One can also remove all such comments from the original Doconce file by running:

```
Terminal> doconce remove_inline_comments mydoc
```

This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.

## 4.1 HTML

Making an HTML version of a Doconce file `mydoc.do.txt` is performed by

```
Terminal> doconce format html mydoc
```

The resulting file `mydoc.html` can be loaded into any web browser for viewing.

## 4.2 LaTeX

Making a LaTeX file `mydoc.tex` from `mydoc.do.txt` is done in two steps: .. Note: putting code blocks inside a list is not successful in many

**Step 1. Filter the doconce text to a pre-LaTeX form `mydoc.p.tex` for `ptex2tex`:**

```
Terminal> doconce format latex mydoc
```

LaTeX-specific commands (“newcommands”) in math formulas and similar can be placed in files `newcommands.tex`, `newcommands_keep.tex`, or `newcommands_replace.tex` (see the section *Macros (Newcommands), Cross-References, Index, and Bibliography*). If these files are present, they are included in the LaTeX document so that your commands are defined.

**Step 2. Run `ptex2tex` (if you have it) to make a standard LaTeX file,**

```
Terminal> ptex2tex mydoc
```

or just perform a plain copy,

```
Terminal> cp mydoc.p.tex mydoc.tex
```

Doconce generates a `.p.tex` file with some preprocessor macros that can be used to steer certain properties of the LaTeX document. For example, to turn on the Helvetica font instead of the standard Computer Modern font, run

```
Terminal> ptex2tex -DHELVETICA mydoc
```

The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX “maketitle” heading is also available through

```
Terminal> ptex2tex -DLATEX_HEADING=traditional mydoc
```

A separate titlepage can be generate by

```
Terminal> ptex2tex -DLATEX_HEADING=titlepage mydoc
```

The `ptex2tex` tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any `!bc` command in the Doconce source you can insert verbatim block styles as defined in your `.ptex2tex.cfg` file, e.g., `!bc cod` for a code snippet, where `cod` is set to a certain environment in `.ptex2tex.cfg` (e.g., `CodeIntended`). There are over 30 styles to choose from.

**Step 3. Compile `mydoc.tex` and create the PDF file:**

```
Terminal> latex mydoc
Terminal> latex mydoc
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex mydoc
Terminal> dvipdf mydoc
```

If one wishes to use the `Minted_Python`, `Minted_Cpp`, etc., environments in `ptex2tex` for typesetting code, the `minted` LaTeX package is needed. This package is included by running `doconce format` with the `-DMINTED` option:

```
Terminal> ptex2tex -DMINTED mydoc
```

In this case, `latex` must be run with the `-shell-escape` option:

```
Terminal> latex -shell-escape mydoc
Terminal> latex -shell-escape mydoc
```

```
Terminal> makeindex mydoc # if index
Terminal> bibitem mydoc # if bibliography
Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc
```

The `-shell-escape` option is required because the `minted.sty` style file runs the `pygments` program to format code, and this program cannot be run from `latex` without the `-shell-escape` option.

## 4.3 Plain ASCII Text

We can go from Doconce “back to” plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code:

```
Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt
```

## 4.4 reStructuredText

Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file `mydoc.rst`:

```
Terminal> doconce format rst mydoc.do.txt
```

We may now produce various other formats:

```
Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice
```

The OpenOffice file `mydoc.odt` can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.

## 4.5 Sphinx

Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the `doconce sphinx_dir` command:

```
Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinx_dir \
 theme=mytheme file1 file2 file3 ...
```

The keywords `author`, `title`, and `version` are used in the headings of the Sphinx document. By default, `version` is 1.0 and the script will try to deduce authors and title from the doconce files `file1`, `file2`, etc. that together represent the whole document. Note that none of the individual Doconce files `file1`, `file2`, etc. should include the rest as their union makes up the whole document. The default value of `dirname` is `sphinx-rootdir`. The `theme` keyword is used to set the theme for design of HTML output from Sphinx (the default theme is `'default'`).

With a single-file document in `mydoc.do.txt` one often just runs

```
Terminal> doconce sphinx_dir mydoc
```

and then an appropriate Sphinx directory `sphinx-rootdir` is made with relevant files.

The `doconce sphinx_dir` command generates a script `automake-sphinx.sh` for compiling the Sphinx document into an HTML document. This script copies directories named `figs` or `figures` over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, `automake-sphinx.sh` must be edited accordingly. One can either run `automake-sphinx.sh` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `conf.py` configuration file for Sphinx is edited accordingly, and a script `make-themes.sh` can make HTML documents with one or more themes. For example, to realize the themes `fenics` and `pyramid`, one writes

```
Terminal> ./make-themes.sh fenics pyramid
```

The resulting directories with HTML documents are `_build/html_fenics` and `_build/html_pyramid`, respectively. Without arguments, `make-themes.sh` makes all available themes (!).

If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file `mydoc.do.txt`.

*Step 1.* Translate Doconce into the Sphinx dialect of the reStructuredText format:

```
Terminal> doconce format sphinx mydoc
```

*Step 2.* Create a Sphinx root directory with a `conf.py` file, either manually or by using the interactive `sphinx-quickstart` program. Here is a scripted version of the steps with the latter:

```
mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
—
Name of My Sphinx Document
Author
version
version
.rst
index
n
Y
n
n
n
n
Y
n
n
Y
Y
Y
EOF
```

*Step 3.* Copy the `tutorial.rst` file to the Sphinx root directory:

```
Terminal> cp mydoc.rst sphinx-rootdir
```

If you have figures in your document, the relative paths to those will be invalid when you work with `mydoc.rst` in the `sphinx-rootdir` directory. Either edit `mydoc.rst` so that figure file paths are correct, or simply copy your figure directories to `sphinx-rootdir`.

*Step 4.* Edit the generated `index.rst` file so that `mydoc.rst` is included, i.e., add `mydoc` to the `toctree` section so that it becomes

```
.. toctree::
 :maxdepth: 2

 mydoc
```

(The spaces before `mydoc` are important!)

*Step 5.* Generate, for instance, an HTML version of the Sphinx source:

```
make clean # remove old versions
make html
```

*Step 6.* View the result:

```
Terminal> firefox _build/html/index.html
```

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows `!bc:` `cod` gives Python (`code-block:: python` in Sphinx syntax) and `cppcod` gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

## 4.6 Google Code Wiki

There are several different wiki dialects, but Doconce only support the one used by [Google Code](#). The transformation to this format, called `gwiki` to explicitly mark it as the Google Code dialect, is done by

```
Terminal> doconce format gwiki mydoc.do.txt
```

You can then open a new wiki page for your Google Code project, copy the `mydoc.gwiki` output file from `doconce format` and paste the file contents into the wiki page. Press **Preview** or **Save Page** to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

## 4.7 Tweaking the Doconce Output

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the `.rst` file is going to be filtered to LaTeX or HTML, it cannot know if `.eps` or `.png` is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., `sed`, `perl`, `python`, or `scitools subst`, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The `make.sh` files in `docs/manual` and `docs/tutorial` constitute comprehensive examples on how such scripts can be made.

## 4.8 Demos

The current text is generated from a Doconce format stored in the file

```
docs/tutorial/tutorial.do.txt
```



The file `make.sh` in the `tutorial` directory of the Doconce source code contains a demo of how to produce a variety of formats. The source of this tutorial, `tutorial.do.txt` is the starting point. Running `make.sh` and studying the various generated files and comparing them with the original `tutorial.do.txt` file, gives a quick introduction to how Doconce is used in a real case. [Here](#) is a sample of how this tutorial looks in different formats.

There is another demo in the `docs/manual` directory which translates the more comprehensive documentation, `manual.do.txt`, to various formats. The `make.sh` script runs a set of translations.

## 4.9 Dependencies

If you make use of preprocessor directives in the Doconce source, either [Preprocess](#) or [Mako](#) must be installed. To make LaTeX documents (without going through the reStructuredText format) you also need [ptex2tex](#) and some style files that `ptex2tex` potentially makes use of. Going from reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX requires [docutils](#). Making Sphinx documents requires of course [Sphinx](#). All of the mentioned potential dependencies are pure Python packages which are easily installed. If translation to [Pandoc](#) is desired, the Pandoc Haskell program must of course be installed.

# INDICES AND TABLES

- *genindex*
- *modindex*
- *search*

## tutorial.xml

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE document PUBLIC "-//IDN docutils.sourceforge.net//DTD Docutils Generic
//EN//XML" "http://docutils.sourceforge.net/docs/ref/docutils.dtd">
<!-- Generated by Docutils 0.9 -->
<document source="tutorial.rst"><comment xml:space="preserve">Automatically gene
rated reST file from Doconce source
(http://code.google.com/p/doconce/)</comment><section ids="doconce-document-once
-include-anywhere" names="doconce:\ document\ once,\ include\ anywhere"><title>D
oconce: Document Once, Include Anywhere</title><field_list><field><field_name>Au
thor</field_name><field_body><paragraph>Hans Petter Langtangen</paragraph></fiel
d_body></field><field><field_name>Date</field_name><field_body><paragraph>Jan 5,
2012</paragraph><bullet_list bullet="*"><list_item><paragraph>When writing a no
te, report, manual, etc., do you find it difficult
to choose the typesetting format? That is, to choose between plain
(email-like) text, wiki, Word/OpenOffice, LaTeX, HTML,
reStructuredText, Sphinx, XML, etc. Would it be convenient to
start with some very simple text-like format that easily converts
to the formats listed above, and then at some later stage
eventually go with a particular format?</paragraph></list_item><list_item><parag
raph>Do you need to write documents in varying formats but find it
difficult to remember all the typesetting details of various
formats like <reference name="LaTeX" refuri="http://refcards.com/docs/silvermanj
/amslatex/LaTeXRefCard.v2.0.pdf">LaTeX</reference><target ids="latex" names="lat
ex" refuri="http://refcards.com/docs/silvermanj/amslatex/LaTeXRefCard.v2.0.pdf"/
>, <reference name="HTML" refuri="http://www.htmlcodetutorial.com/">HTML</refere
nce><target ids="html" names="html" refuri="http://www.htmlcodetutorial.com/">,
<reference name="reStructuredText" refuri="http://docutils.sourceforge.net/docs
/ref/rst/restructuredtext.html">reStructuredText</reference><target ids="restruc
turedtext" names="restructuredtext" refuri="http://docutils.sourceforge.net/docs
/ref/rst/restructuredtext.html"/>, <reference name="Sphinx" refuri="http://sphin
x.pocoo.org/contents.html">Sphinx</reference><target dupnames="sphinx" ids="sphi
nx" refuri="http://sphinx.pocoo.org/contents.html"/>, and <reference name="wiki"
refuri="http://code.google.com/p/support/wiki/WikiSyntax">wiki</reference><targ
et ids="wiki" names="wiki" refuri="http://code.google.com/p/support/wiki/WikiSyn
tax"/>? Would it be convenient
to generate the typesetting details of a particular format from a
very simple text-like format with minimal tagging?</paragraph></list_item><list_
item><paragraph>Do you have the same information scattered around in different
documents in different typesetting formats? Would it be a good idea
to write things once, in one format, stored in one place, and
include it anywhere?</paragraph></list_item></bullet_list></field_body></field><
/field_list><paragraph>If any of these questions are of interest, you should kee
p on reading.</paragraph></section><section ids="the-doconce-concept" names="the
\ doconce\ concept"><title>The Doconce Concept</title><paragraph>Doconce is two
things:</paragraph><block_quote><enumerated_list enumtype="arabic" prefix="" suf
fix="."><list_item><paragraph>Doconce is a very simple and minimally tagged mark
up language that
looks like ordinary ASCII text (much like what you would use in an
email), but the text can be transformed to numerous other formats,
including HTML, wiki, LaTeX, PDF, reStructuredText (reST), Sphinx,
Epytext, and also plain text (where non-obvious formatting/tags are
removed for clear reading in, e.g., emails). From reStructuredText
you can go to XML, HTML, LaTeX, PDF, OpenOffice, and from the
latter to RTF and MS Word.
(An experimental translator to Pandoc is under development, and from
Pandoc one can generate Markdown, reST, LaTeX, HTML, PDF, DocBook XML,
OpenOffice, GNU Texinfo, MediaWiki, RTF, Groff, and other formats.)</paragraph><
/field_list><list_item><list_item><paragraph>Doconce is a working strategy for never duplica
ting information.
```

## tutorial.xml

Text is written in a single place and then transformed to a number of different destinations of diverse type (software source code, manuals, tutorials, books, wikis, memos, emails, etc.). The Doconce markup language support this working strategy. The slogan is: "Write once, include anywhere".

Here are some Doconce features:

- Doconce markup does include tags, so the format is more tagged than Markdown and Pandoc, but less than reST, and very much less than LaTeX and HTML.
- Doconce can be converted to plain **untagged** text, often desirable for computer programs and email.
- Doconce has good support for copying in parts of computer code, say in examples, directly from the source code files.
- Doconce has full support for LaTeX math, and integrates very well with big LaTeX projects (books).
- Doconce is almost self-explanatory and is a handy starting point for generating documents in more complicated markup languages, such as Google wiki, LaTeX, and Sphinx. A primary application of Doconce is just to make the initial versions of a Sphinx or wiki document.
- Contrary to the similar Pandoc translator, Doconce integrates with Sphinx and Google wiki. However, if these formats are not of interest, Pandoc is obviously a superior tool.
- Doconce was particularly written for the following sample applications:
- Large books written in LaTeX, but where many pieces (computer demos, projects, examples) can be written in Doconce to appear in other contexts in other formats, including plain HTML, Sphinx, wiki, or MS Word.
- Software documentation, primarily Python doc strings, which one wants to appear as plain untagged text for viewing in Pydoc, as reStructuredText for use with Sphinx, as wiki text when publishing the software at web sites, and as LaTeX integrated in, e.g., a thesis.
- Quick memos, which start as plain text in email, then some small amount of Doconce tagging is added, before the memos can appear as Sphinx web pages, MS Word documents, or in wikis.
- History: Doconce was developed in 2006 at a time when most popular markup languages used quite some tagging. Later, almost untagged markup languages like Markdown and Pandoc became popular. Doconce is not a replacement of Pandoc, which is a considerably more sophisticated project. Moreover, Doconce was developed mainly to fulfill the needs for a flexible source code base for books with much mathematics and computer code.
- Disclaimer:** Doconce is a simple tool, largely based on interpreting and handling text through regular expressions. The possibility for tweaking the layout is obviously limited since the text can go to all sorts of sophisticated markup languages. Moreover, because of limitations of regular expressions, some formatting of Doconce syntax may face problems when transformed to HTML, LaTeX, Sphinx, and similar formats.

## What Does Doconce Look Like?

Doconce text looks like ordinary text, but there are some almost invisible text constructions that allow you to control the formatting. Here are some examples.

-

## tutorial.xml

aph>Bullet lists arise from lines starting with an asterisk.</paragraph></list\_item><list\_item><paragraph><emphasis>Emphasized words</emphasis> are surrounded by asterisks.</paragraph></list\_item><list\_item><paragraph><strong>Words in boldface</strong> are surrounded by underscores.</paragraph></list\_item><list\_item><paragraph>Words from computer code are enclosed in back quotes and then typeset <literal>verbatim (in a monospace font)</literal>.</paragraph></list\_item><list\_item><paragraph>Section headings are recognized by equality (<literal>=</literal>) signs before and after the title, and the number of <literal>=</literal> signs indicates the level of the section: 7 for main section, 5 for subsection, and 3 for subsubsection.</paragraph></list\_item><list\_item><paragraph>Paragraph headings are recognized by a double underscore before and after the heading.</paragraph></list\_item><list\_item><paragraph>The abstract of a document starts with <emphasis>Abstract</emphasis> as paragraph heading, and all text up to the next heading makes up the abstract,</paragraph></list\_item><list\_item><paragraph>Blocks of computer code can easily be included by placing <literal>!bc</literal> (begin code) and <literal>!ec</literal> (end code) commands at separate lines before and after the code block.</paragraph></list\_item><list\_item><paragraph>Blocks of computer code can also be imported from source files.</paragraph></list\_item><list\_item><paragraph>Blocks of LaTeX mathematics can easily be included by placing <literal>!bt</literal> (begin TeX) and <literal>!et</literal> (end TeX) commands at separate lines before and after the math block.</paragraph></list\_item><list\_item><paragraph>There is support for both LaTeX and text-like inline mathematics.</paragraph></list\_item><list\_item><paragraph>Figures and movies with captions, simple tables, URLs with links, index list, labels and references are supported.</paragraph></list\_item><list\_item><paragraph>Invisible comments in the output format can be inserted throughout the text (<literal>#</literal> at the beginning of a line).</paragraph></list\_item><list\_item><paragraph>Visible comments can be inserted so that authors and readers can comment upon the text (and at any time turn on/off output of such comments).</paragraph></list\_item><list\_item><paragraph>There is special support for advanced exercises features.</paragraph></list\_item><list\_item><paragraph>With a simple preprocessor, Preprocess or Mako, one can include other documents (files) and large portions of text can be defined in or out of the text.</paragraph></list\_item><list\_item><paragraph>With the Mako preprocessor one can even embed Python code and use this to steer generation of Doconce text.</paragraph></list\_item></bullet\_list></block\_quote><paragraph>Here is an example of some simple text written in the Doconce format:</paragraph><literal\_block xml:space="preserve">====  
A Subsection with Sample Text =====  
label{my:first:sec}

Ordinary text looks like ordinary text, and the tags used for `_boldface_` words, `*emphasized*` words, and `'computer'` words look natural in plain text. Lists are typeset as you would do in an email,

- \* item 1
- \* item 2
- \* item 3

Lists can also have automatically numbered items instead of bullets,

- o item 1
- o item 2

## tutorial.xml

o item 3

URLs with a link word are possible, as in `<reference name="hpl" refuri="http://folk.uio.no/hpl">hpl</reference>`.

If the word is URL, the URL itself becomes the link name, as in `<reference name="URL" refuri="tutorial.do.txt">URL</reference>`.

References to sections may use logical names as labels (e.g., a `<reference name="label" refid="a-subsection-with-sample-text my:first-sec">label</reference>` command right after the section title), as in the reference to Section `ref{my:first:sec}`.

Doconce also allows inline comments such as `[hpl: here I will make some remarks to the text]` for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument (see Section `ref{doconce2formats}` for an example).

Tables are also supported, e.g.,

| time | velocity | acceleration |
|------|----------|--------------|
| 0.0  | 1.4186   | -5.01        |
| 2.0  | 1.376512 | 11.919       |
| 4.0  | 1.1E+1   | 14.717624    |

# lines beginning with # are comment lines

The Doconce text above results in the following little document:

```
<target refid="my-first-sec">
<section ids="a-subsection-with-sample-text my-first-sec" names="a\ subsection\ with\ sample\ text my:first:sec">
<title>A Subsection with Sample Text</title>
<paragraph>Ordinary text looks like ordinary text, and the tags used for
```

```
boldface words, <emphasis>emphasized</emphasis> words, and <literal>computer</literal> words look
```

```
natural in plain text. Lists are typeset as you would do in an email,
<block_quote>
<bullet_list bullet="*">
<list_item><paragraph>item 1</paragraph></list_item>
<list_item><paragraph>item 2</paragraph></list_item>
<list_item><paragraph>item 3</paragraph></list_item>
</bullet_list>
</block_quote>
<paragraph>Lists can also have numbered items instead of bullets, just use an <literal>o</literal>
```

```
>
(for ordered) instead of the asterisk:
<block_quote>
<enumerated_list enumtype="arabic" prefix="" suffix=".">
<list_item><paragraph>item 1</paragraph></list_item>
<list_item><paragraph>item 2</paragraph></list_item>
<list_item><paragraph>item 3</paragraph></list_item>
</enumerated_list>
</block_quote>
<paragraph>URLs with a link word are possible, as in <reference name="hpl" refuri="http://folk.uio.no/hpl">hpl</reference>
<target ids="hpl" names="hpl" refuri="http://folk.uio.no/hpl">
```

```
If the word is URL, the URL itself becomes the link name,
as in <reference name="tutorial.do.txt" refuri="tutorial.do.txt">tutorial.do.txt</reference>
<target ids="tutorial-do-txt" names="tutorial.do.txt" refuri="tutorial.do.txt">.
</paragraph>
<paragraph>References to sections may use logical names as labels (e.g., a
```

```
<reference name="label" refid="a-subsection-with-sample-text">label</reference>
command right after the section title), as in the reference to the section
<reference name="A Subsection with Sample Text" refid="a-subsection-with-sample-text">A Subsection with Sample Text</reference>.
</paragraph>
<paragraph>Doconce also allows inline comments such as (hpl: here I will make
```

```
some remarks to the text) for allowing authors to make notes. Inline comments can be removed from the output by a command-line argument
```

## tutorial.xml

(see the section `<reference name="From Doconce to Other Formats" refid="from-doc once-to-other-formats">From Doconce to Other Formats</reference>` for an example)

Tables are also supported, e.g.,

time	velocity	acceleration
0.0	1.4186	-5.01
2.0	1.376512	11.919
4.0	1.1E+1	14.717624

Inline mathematics, such as  $v = \sin(x)$ , allows the formula to be specified both as LaTeX and as plain text. This results in a professional LaTeX typesetting, but in other formats the text version normally looks better than raw LaTeX mathematics with backslashes. An inline formula like  $v = \sin(x)$  is typeset as:

$$\nu = \sin(x) \quad v = \sin(x)$$

The pipe symbol acts as a delimiter between LaTeX code and the plain text version of the formula.

Blocks of mathematics are better typeset with raw LaTeX, inside `<literal>!bt</literal>` and `<literal>!et</literal>` (begin tex / end tex) instructions. The result looks like this:

$$\begin{aligned} \frac{\partial u}{\partial t} &= \nabla^2 u + f, \\ \frac{\partial v}{\partial t} &= \nabla \cdot (q(u) \nabla v) + g \end{aligned}$$

Of course, such blocks only looks nice in LaTeX. The raw LaTeX syntax appears in all other formats (but can still be useful for those who can read LaTeX syntax).

You can have blocks of computer code, starting and ending with `<literal>!bc</literal>` and `<literal>!ec</literal>` instructions, respectively. Such blocks look like:

```
from math import sin, pi
def myfunc(x):
 return sin(pi*x)

import integrate
I = integrate.trapezoidal(myfunc, 0, pi, 100)
```

A code block must come after some plain sentence (at least for successful output to Sphinx, rst, and ASCII-close for mats), not directly after a section/paragraph heading or a table.

It is possible to add a specification of an environment for typesetting the verbatim code block, e.g., `<literal>!bc xxx</literal>` where `<literal>xxx</literal>` is an identifier like `<literal>pycod</literal>` for code snippet in Python, `<literal>sys</literal>` for terminal session, etc. When Doconce is filtered to LaTeX, these identifiers are used as in `<literal>ptex2tex</literal>` and defined in a configuration file `<literal>.ptext2tex.cfg</literal>`, while when filtering to Sphinx, one can have a comment line in the Doconce file for mapping the identifiers to legal language names for Sphinx (which equals the legal language names for Pygments):

## tutorial.xml

```

serve"># sphinx code-blocks: pycod=python cod=fortran cppcod=c++ sys=console</li
literal_block><paragraph>By default, <literal>pro</literal> and <literal>cod</lite
ral> are <literal>python</literal>, <literal>sys</literal> is <literal>console</
literal>,
while <literal>xpro</literal> and <literal>xcod</literal> are computer language
specific for <literal>x</literal>
in <literal>f</literal> (Fortran), <literal>c</literal> (C), <literal>cpp</liter
al> (C++), <literal>pl</literal> (Perl), <literal>m</literal> (Matlab),
<literal>sh</literal> (Unix shells), <literal>cy</literal> (Cython), and <litera
l>py</literal> (Python).</paragraph><comment xml:space="preserve">(Any sphinx co
de-block comment, whether inside verbatim code</comment><comment xml:space="pres
erve">blocks or outside, yields a mapping between bc arguments</comment><comment
xml:space="preserve">and computer languages. In case of muliple definitions, th
e</comment><comment xml:space="preserve">first one is used.)</comment><paragraph
>One can also copy computer code directly from files, either the
complete file or specified parts. Computer code is then never
duplicated in the documentation (important for the principle of
avoiding copying information!). A complete file is typeset
with <literal>!bc pro</literal>, while a part of a file is copied into a <litera
l>!bc cod</literal>
environment. What <literal>pro</literal> and <literal>cod</literal> mean is then
defined through
a <literal>.ptex2tex.cfg</literal> file for LaTeX and a <literal>sphinx code-blo
cks</literal>
comment for Sphinx.</paragraph><paragraph>Another document can be included by wr
iting <literal>#include "mynote.do.txt"</literal>
on a line starting with (another) hash sign. Doconce documents have
extension <literal>.do.txt</literal>. The <literal>do</literal> part stands for d
oconce, while the
trailing <literal>.txt</literal> denotes a text document so that editors gives y
ou the
right writing enviroment for plain text.</paragraph><target refid="newcommands"/
></section><section ids="macros-newcommands-cross-references-index-and-bibliogra
phy newcommands" names="macros\ (newcommands),\ cross-references,\ index,\ and\
bibliography newcommands"><title>Macros (Newcommands), Cross-References, Index,
and Bibliography</title><paragraph>Doconce supports a type of macros via a LaTeX
-style <emphasis>newcommand</emphasis>
construction. The newcommands defined in a file with name
<literal>newcommand_replace.tex</literal> are expanded when Doconce is filtered
to
other formats, except for LaTeX (since LaTeX performs the expansion
itself). Newcommands in files with names <literal>newcommands.tex</literal> and
<literal>newcommands_keep.tex</literal> are kept unaltered when Doconce text is
filtered to other formats, except for the Sphinx format. Since Sphinx
understands LaTeX math, but not newcommands if the Sphinx output is
HTML, it makes most sense to expand all newcommands. Normally, a user
will put all newcommands that appear in math blocks surrounded by
<literal>!bt</literal> and <literal>!et</literal> in <literal>newcommands_keep.t
ex</literal> to keep them unchanged, at
least if they contribute to make the raw LaTeX math text easier to
read in the formats that cannot render LaTeX. Newcommands used
elsewhere throughout the text will usually be placed in
<literal>newcommands_replace.tex</literal> and expanded by Doconce. The definit
ions of
newcommands in the <literal>newcommands*.tex</literal> files <emphasis>must</emp
hasis> appear on a single
line (multi-line newcommands are too hard to parse with regular
expressions).</paragraph><paragraph>Recent versions of Doconce also offer cross
referencing, typically one

```



## tutorial.xml

can define labels below (sub)sections, in figure captions, or in equations, and then refer to these later. Entries in an index can be defined and result in an index at the end for the LaTeX and Sphinx formats. Citations to literature, with an accompanying bibliography in a file, are also supported. The syntax of labels, references, citations, and the bibliography closely resembles that of LaTeX, making it easy for Doconce documents to be integrated in LaTeX projects (manuals, books). For further details on functionality and syntax we refer to the `<literal>doc/manual/manual.do.txt</literal>` file (see the `<reference name="demo page" refuri="https://doconce.googlecode.com/hg/doc/demos/manual/index.html">demo page</reference><target ids="demo-page" names="demo\ page" refuri="https://doconce.googlecode.com/hg/doc/demos/manual/index.html"/>` for various formats of this document).

Example on including another Doconce file (using preprocess):

```
<target refid="doconce2formats"/></section><section ids="from-doconce-to-other-formats doconce2formats" names="from\ doconce\ to\ other\ formats doconce2formats"><title>From Doconce to Other Formats</title><paragraph>Transformation of a Doconce document <literal>mydoc.do.txt</literal> to various other formats applies the script <literal>doconce format</literal>:
<literal_block xml:space="preserve">Terminal> doconce format format mydoc.do.txt</literal_block>
<paragraph>or just:
<literal_block xml:space="preserve">Terminal> doconce format format mydoc</literal_block>
<paragraph>The <literal>mako</literal> or <literal>preprocess</literal> programs are always used to preprocess the file first, and options to <literal>mako</literal> or <literal>preprocess</literal> can be added after the filename. For example:
<literal_block xml:space="preserve">Terminal> doconce format latex mydoc -Dextra_sections -DVAR1=5 # preprocess
Terminal> doconce format latex yourdoc extra_sections=True VAR1=5 # mako</literal_block>
<paragraph>The variable <literal>FORMAT</literal> is always defined as the current format when running <literal>preprocess</literal>. That is, in the last example, <literal>FORMAT</literal> is defined as <literal>latex</literal>. Inside the Doconce document one can then perform format specific actions through tests like <literal>#if FORMAT == "latex"
ot;</literal>.</paragraph>
<paragraph>Inline comments in the text are removed from the output by:
<literal_block xml:space="preserve">Terminal> doconce format latex mydoc --skip_inline_comments</literal_block>
<paragraph>One can also remove all such comments from the original Doconce file by running:
<literal_block xml:space="preserve">Terminal> doconce remove_inline_comments mydoc</literal_block>
<paragraph>This action is convenient when a Doconce document reaches its final form and comments by different authors should be removed.</paragraph>
<section dupnames="html" ids="id1"><title>HTML</title>
<paragraph>Making an HTML version of a Doconce file <literal>mydoc.do.txt</literal> is performed by:
<literal_block xml:space="preserve">Terminal> doconce format html mydoc</literal_block>
<paragraph>The resulting file <literal>mydoc.html</literal> can be loaded into any web browser for viewing.</paragraph>
</section>
<section dupnames="latex" ids="id2"><title>LaTeX</title>
<paragraph>Making a LaTeX file <literal>mydoc.tex</literal> from <literal>mydoc.do.txt</literal> is done in two steps:
.. Note: putting code blocks inside a list is not successful in many
<comment xml:space="preserve">formats - the text may be messed up. A better choice is a paragraph</comment>
<comment xml:space="preserve">environment, as used here.</comment>
<definition_list>
<definition_list_item>
<term><emphasis>Step 1.</emphasis> Filter the doconce text to a pre-LaTeX form <literal>mydoc.p.tex</literal>
</term>
<definition>
<paragraph><literal>ptex2tex</literal>:
<literal_block xml:space="preserve">Terminal> doconce format latex mydoc</literal_block>
```

## tutorial.xml

block></definition></definition\_list\_item></definition\_list><paragraph>LaTeX-specific commands (&quot;newcommands&quot;) in math formulas and similar can be placed in files <literal>newcommands.tex</literal>, <literal>newcommands\_keep.tex</literal>, or <literal>newcommands\_replace.tex</literal> (see the section <reference name="Macros (Newcommands), Cross-References, Index, and Bibliography" refid="macros-newcommands-cross-references-index-and-bibliography">Macros (Newcommands), Cross-References, Index, and Bibliography</reference>). If these files are present, they are included in the LaTeX document so that your commands are defined.</paragraph><paragraph><emphasis>Step 2.</emphasis> Run <literal>ptex2tex</literal> (if you have it) to make a standard LaTeX file:</paragraph><literal\_block xml:space="preserve">Terminal&gt; ptex2tex mydoc</literal\_block><paragraph>or just perform a plain copy:</paragraph><literal\_block xml:space="preserve">Terminal&gt; cp mydoc.p.tex mydoc.tex</literal\_block><paragraph>Doconce generates a <literal>.p.tex</literal> file with some preprocessing macros that can be used to steer certain properties of the LaTeX document. For example, to turn on the Helvetica font instead of the standard Computer Modern font, run:</paragraph><literal\_block xml:space="preserve">Terminal&gt; ptex2tex -DHELIVETICA mydoc</literal\_block><paragraph>The title, authors, and date are by default typeset in a non-standard way to enable a nicer treatment of multiple authors having institutions in common. However, the standard LaTeX &quot;maketitle&quot; heading is also available through:</paragraph><literal\_block xml:space="preserve">Terminal&gt; ptex2tex -DLATEX\_HEADING=traditional mydoc</literal\_block><paragraph>A separate titlepage can be generated by:</paragraph><literal\_block xml:space="preserve">Terminal&gt; ptex2tex -DLATEX\_HEADING=titlepage mydoc</literal\_block><paragraph>The <literal>ptex2tex</literal> tool makes it possible to easily switch between many different fancy formattings of computer or verbatim code in LaTeX documents. After any <literal>!bc</literal> command in the Doconce source you can insert verbatim block styles as defined in your <literal>.ptex2tex.cfg</literal> file, e.g., <literal>!bc cod</literal> for a code snippet, where <literal>cod</literal> is set to a certain environment in <literal>.ptex2tex.cfg</literal> (e.g., <literal>CodeIntended</literal>). There are over 30 styles to choose from.</paragraph><paragraph><emphasis>Step 3.</emphasis> Compile <literal>mydoc.tex</literal> and create the PDF file:</paragraph><literal\_block xml:space="preserve">Terminal&gt; latex mydoc  
Terminal&gt; latex mydoc  
Terminal&gt; makeindex mydoc # if index  
Terminal&gt; bibitem mydoc # if bibliography  
Terminal&gt; latex mydoc  
Terminal&gt; dvipdf mydoc</literal\_block><paragraph>If one wishes to use the <literal>Minted\_Python</literal>, <literal>Minted\_Cpp</literal>, etc., environments in <literal>ptex2tex</literal> for typesetting code, the <literal>minted</literal> LaTeX package is needed. This package is included by running <literal>doconce format</literal> with the <literal>-DMINTED</literal> option:</paragraph><literal\_block xml:space="preserve">Terminal&gt; ptex2tex -DMINTED mydoc</literal\_block><paragraph>In this case, <literal>latex</literal> must be run with the <literal>-shell-escape</literal> option:</paragraph><literal\_block xml:space="preserve">Terminal&gt; latex -shell-escape mydoc  
Terminal&gt; latex -shell-escape mydoc  
Terminal&gt; makeindex mydoc # if index  
Terminal&gt; bibitem mydoc # if bibliography

## tutorial.xml

```

Terminal> latex -shell-escape mydoc
Terminal> dvipdf mydoc</literal_block><paragraph>The <literal>-shell-escape</literal> option is required because the <literal>minted.sty</literal> style file runs the <literal>pygments</literal> program to format code, and this program cannot be run from <literal>latex</literal> without the <literal>-shell-escape</literal> option.</paragraph></section><section ids="plain-ascii-text" names="plain\ ascii\ text"><title>Plain ASCII Text</title><paragraph>We can go from Doconce "back to" plain untagged text suitable for viewing in terminal windows, inclusion in email text, or for insertion in computer source code:</paragraph><literal_block xml:space="preserve">Terminal> doconce format plain mydoc.do.txt # results in mydoc.txt</literal_block></section><section dupnames="restructuredtext" ids="id3"><title>reStructuredText</title><paragraph>Going from Doconce to reStructuredText gives a lot of possibilities to go to other formats. First we filter the Doconce text to a reStructuredText file <literal>mydoc.rst</literal>:</paragraph><literal_block xml:space="preserve">Terminal> doconce format rst mydoc.do.txt</literal_block><paragraph>We may now produce various other formats:</paragraph><literal_block xml:space="preserve">Terminal> rst2html.py mydoc.rst > mydoc.html # html
Terminal> rst2latex.py mydoc.rst > mydoc.tex # latex
Terminal> rst2xml.py mydoc.rst > mydoc.xml # XML
Terminal> rst2odt.py mydoc.rst > mydoc.odt # OpenOffice</literal_block><paragraph>The OpenOffice file <literal>mydoc.odt</literal> can be loaded into OpenOffice and saved in, among other things, the RTF format or the Microsoft Word format. That is, one can easily go from Doconce to Microsoft Word.</paragraph></section><section dupnames="sphinx" ids="id4"><title>Sphinx</title><paragraph>Sphinx documents demand quite some steps in their creation. We have automated most of the steps through the <literal>doconce sphinx_dir</literal> command:</paragraph><literal_block xml:space="preserve">Terminal> doconce sphinx_dir author="authors' names" \
 title="some title" version=1.0 dirname=sphinxdir \
 theme=mytheme file1 file2 file3 ...</literal_block><paragraph>The keywords <literal>author</literal>, <literal>title</literal>, and <literal>version</literal> are used in the headings of the Sphinx document. By default, <literal>version</literal> is 1.0 and the script will try to deduce authors and title from the doconce files <literal>file1</literal>, <literal>file2</literal>, etc. that together represent the whole document. Note that none of the individual Doconce files <literal>file1</literal>, <literal>file2</literal>, etc. should include the rest as their union makes up the whole document. The default value of <literal>dirname</literal> is <literal>sphinx-rootdir</literal>. The <literal>theme</literal> keyword is used to set the theme for design of HTML output from Sphinx (the default theme is <literal>'default'</literal>).</paragraph><paragraph>With a single-file document in <literal>mydoc.do.txt</literal> one often just runs:</paragraph><literal_block xml:space="preserve">Terminal> doconce sphinx_dir mydoc</literal_block><paragraph>and then an appropriate Sphinx directory <literal>sphinx-rootdir</literal> is made with relevant files.</paragraph><paragraph>The <literal>doconce sphinx_dir</literal> command generates a script <literal>automake-sphinx.sh</literal> for compiling the Sphinx document into an HTML document. This script copies directories named <literal>figs</literal> or <literal>figures</literal>

```

## tutorial.xml

over to the Sphinx directory so that figures are accessible in the Sphinx compilation. If figures or movies are located in other directories, `<literal>automake-sphinx.sh</literal>` must be edited accordingly. One can either run `<literal>automake-sphinx.sh</literal>` or perform the steps in the script manually.

Doconce comes with a collection of HTML themes for Sphinx documents. These are packed out in the Sphinx directory, the `<literal>conf.py</literal>` configuration file for Sphinx is edited accordingly, and a script `<literal>make-themes.sh</literal>` can make HTML documents with one or more themes.

For example, to realize the themes `<literal>fenics</literal>` and `<literal>pyramid</literal>`, one writes:

```

<literal_block xml:space="preserve">Terminal> ./make-themes.sh fenics pyramid</literal_block>
<paragraph>The resulting directories with HTML documents are <literal>_build/html_fenics</literal> and <literal>_build/html_pyramid</literal>, respectively. Without arguments, <literal>make-themes.sh</literal> makes all available themes (!).</paragraph>
<paragraph>If it is not desirable to use the autogenerated scripts explained above, here are the complete manual procedure of generating a Sphinx document from a file <literal>mydoc.do.txt</literal>.</paragraph>
<paragraph><emphasis>Step 1.</emphasis> Translate Doconce into the Sphinx dialect of the reStructuredText format:</paragraph>
<literal_block xml:space="preserve">Terminal> doconce format sphinx mydoc</literal_block>
<paragraph><emphasis>Step 2.</emphasis> Create a Sphinx root directory with a <literal>conf.py</literal> file, either manually or by using the interactive <literal>sphinx-quickstart</literal> program. Here is a scripted version of the steps with the latter:</paragraph>
<literal_block xml:space="preserve">mkdir sphinx-rootdir
sphinx-quickstart <<EOF
sphinx-rootdir
n
-
Name of My Sphinx Document
Author
version
version
.rst
index
n
y
n
n
n
n
y
n
n
y
y
y
EOF</literal_block>
<paragraph><emphasis>Step 3.</emphasis> Copy the <literal>tutorial.rst</literal> file to the Sphinx root directory:</paragraph>
<literal_block xml:space="preserve">Terminal> cp mydoc.rst sphinx-rootdir</literal_block>
<paragraph>If you have figures in your document, the relative paths to those will be invalid when you work with <literal>mydoc.rst</literal> in the <literal>sphinx-rootdir</literal> directory. Either edit <literal>mydoc.rst</literal> so that figure file paths are correct,

```

## tutorial.xml

or simply copy your figure directories to `<literal>sphinx-rootdir</literal>`.

**Step 4.** Edit the generated `<literal>index.rst</literal>` file so that `<literal>mydoc.rst</literal>` is included, i.e., add `<literal>mydoc</literal>` to the `<literal>toctree</literal>` section so that it becomes:

```
toctree::
 :maxdepth: 2

 mydoc</literal_block>
```

(The spaces before `<literal>mydoc</literal>` are important!)

**Step 5.** Generate, for instance, an HTML version of the Sphinx source:

```
make clean # remove old versions
make html</literal_block>
```

**Step 6.** View the result: `Terminal> firefox _build/html/index.html</literal_block>`

Note that verbatim code blocks can be typeset in a variety of ways depending the argument that follows `<literal>!bc</literal>`: `<literal>cod</literal>` gives Python (`<literal>code-block:: python</literal>` in Sphinx syntax) and `<literal>cppcod</literal>` gives C++, but all such arguments can be customized both for Sphinx and LaTeX output.

### Google Code Wiki

There are several different wiki dialects, but Doconce only support the one used by [Google Code](http://code.google.com/p/support/wiki/WikiSyntax). The transformation to this format, called `<literal>gwiki</literal>` to explicitly mark it as the Google Code dialect, is done by:

```
Terminal> doconce format gwiki mydoc.do.txt</literal_block>
```

You can then open a new wiki page for your Google Code project, copy the `<literal>mydoc.gwiki</literal>` output file from `<literal>doconce format</literal>` and paste the file contents into the wiki page. Press **Preview** or **Save Page** to see the formatted result.

When the Doconce file contains figures, each figure filename must be replaced by a URL where the figure is available. There are instructions in the file for doing this. Usually, one performs this substitution automatically (see next section).

### Tweaking the Doconce Output

Occasionally, one would like to tweak the output in a certain format from Doconce. One example is figure filenames when transforming Doconce to reStructuredText. Since Doconce does not know if the `<literal>.rst</literal>` file is going to be filtered to LaTeX or HTML, it cannot know if `<literal>.eps</literal>` or `<literal>.png</literal>` is the most appropriate image filename. The solution is to use a text substitution command or code with, e.g., `sed`, `perl`, `python`, or `scitools subst`, to automatically edit the output file from Doconce. It is then wise to run Doconce and the editing commands from a script to automate all steps in going from Doconce to the final format(s). The `<literal>make.sh</literal>` files in `<literal>docs/manual</literal>` and `<literal>docs/tutorial</literal>` constitute comprehensive examples on how such scripts can be made.

### Demos

The current text is generated from a Doconce format stored in the file:

## tutorial.xml

```

teral_block xml:space="preserve">docs/tutorial/tutorial.do.txt</literal_block><p
aragraph>The file <literal>make.sh</literal> in the <literal>tutorial</literal>
directory of the
Doconce source code contains a demo of how to produce a variety of
formats. The source of this tutorial, <literal>tutorial.do.txt</literal> is the
starting point. Running <literal>make.sh</literal> and studying the various gen
erated
files and comparing them with the original <literal>tutorial.do.txt</literal> fi
le,
gives a quick introduction to how Doconce is used in a real case.
<reference name="Here" refuri="https://doconce.googlecode.com/hg/doc/demos/tutor
ial/index.html">Here</reference><target ids="here" names="here" refuri="https://
doconce.googlecode.com/hg/doc/demos/tutorial/index.html"/>
is a sample of how this tutorial looks in different formats.</paragraph><paragra
ph>There is another demo in the <literal>docs/manual</literal> directory which
translates the more comprehensive documentation, <literal>manual.do.txt</literal
>, to
various formats. The <literal>make.sh</literal> script runs a set of translation
s.</paragraph></section><section ids="dependencies" names="dependencies"><title>
Dependencies</title><system_message backrefs="id5" level="2" line="398" source="
tutorial.rst" type="WARNING"><paragraph>Duplicate explicit target name: "sp
hinx".</paragraph></system_message><paragraph>If you make use of preprocess
or directives in the Doconce source,
either <reference name="Preprocess" refuri="http://code.google.com/p/preprocess"
>Preprocess</reference><target ids="preprocess" names="preprocess" refuri="http:
//code.google.com/p/preprocess"/> or <reference name="Mako" refuri="http://www.m
akotemplates.org">Mako</reference><target ids="mako" names="mako" refuri="http:/
/www.makotemplates.org"/> must be installed. To make LaTeX
documents (without going through the reStructuredText format) you also
need <reference name="ptex2tex" refuri="http://code.google.com/p/ptex2tex">ptex2
tex</reference><target ids="ptex2tex" names="ptex2tex" refuri="http://code.googl
e.com/p/ptex2tex"/> and some style
files that <literal>ptex2tex</literal> potentially makes use of. Going from
reStructuredText to formats such as XML, OpenOffice, HTML, and LaTeX
requires <reference name="docutils" refuri="http://docutils.sourceforge.net">doc
utils</reference><target ids="docutils" names="docutils" refuri="http://docutils
.sourceforge.net"/>. Making Sphinx
documents requires of course <reference name="Sphinx" refuri="http://sphinx.poco
o.org">Sphinx</reference><target dupnames="sphinx" ids="id5" refuri="http://sphi
nx.pocoo.org"/>.
All of the mentioned potential dependencies are pure Python packages
which are easily installed.
If translation to <reference name="Pandoc" refuri="http://johnmacfarlane.net/pan
doc/">Pandoc</reference><target ids="pandoc" names="pandoc" refuri="http://johnm
acfarlane.net/pandoc/"> is desired,
the Pandoc Haskell program must of course be installed.</paragraph></section></s
ection></document>

```