Writing WindForS Articles using LaTeX

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Executive Summary

This document is a guide to writing corporate documents using the LaTeX document preparation system.

LaTeX is not WYSIWYG and has different reviewing and editing tools compared to typical word processing software. For this reason special care has to be taken when preparing documents in LaTeX.

This document also serves as a template. It is intended for people with some familiarity with LaTeX.

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List of Tables

1   What is LaTeX?

LaTeX is a mark-up language that describes how a document should be prepared.

Three things are needed to make a LaTeX document:

1. A source document, usually with extension *.tex*

2. Some packages and classes that help turn what's in the source document into something helpful

3. A compiler, also referred to as a working LaTeX installation.

At first glance the source document looks like a programming language, and that's because it is: LaTeX is not WYSIWYG, like many of the document preparation tools in common use today. A good analogy to LaTeX is html code, which can be read in any text editor but is rendered by web browsers into a finished product.

1.1   Printed Resources

Several excellent LaTeX references exist and may be found useful by some users. Examples include those by Knuth (1984) and Lamport (1986).

1.2   Online Resources

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2   Using LaTeX to Make Corporate Documents

A series of LaTeX class files called *Corporate...cls* have been written to implement common formatting requirements in LaTeX.

2.1   Corporate class files

Class files control the formatting and presentation of documents. The class files currently available include:

CorporateReport.cls compiles the document using the LaTeX *report* class, with corporate formatting. This is intended for longer documents and allows the use of chapters.

CorporateArticle.cls compiles the document using the LaTeX *article* class, with corporate formatting. This is intended for shorter documents such as

journal articles. This class does not support the use of chapters.

CorporateResources.tex contains the common packages and formatting descriptions that are implemented by the *CorporateReport.cls* and *CorporateArticle.cls* classes.

As with normal classes, options are passed to the class in the `\documentclass` line:

```
\documentclass[option 1, ..., option n]{
    CorporateArticle}
```

All of the usual options can be used with the *Corporate*.cls* classes, including *twocolumn, letterpaper,* and so-on.

Options specific to *Corporate*.cls* include:

compact reduce white space around headings and lists.

draft add a 'draft' watermark to all pages.

blacklinks make all links the same color as the rest of the body text.

The *Corporate....cls* files call a variety of other packages. Packages are codes that modify the appearance or behaviour of LaTeX to achieve something. Table 1 lists the packages that are explicitly called by *Corporate*.cls* or *CorporateResources.tex* in the order they are called in. These packages often call other packages, so this is not an exhaustive list.

It should be noted that the 'english' option to Babel really means *American* English.

2.1.1 Starting new documents

1. Go to https://github.com/xx and download the latest version of the repository as a .zip file from the icon on the lower right hand side of the page.

2. Modify *main*.tex* as required.

2.2 Creating Content

2.2.1 Front, main, and back matter

The convention in this corporate class is to have Roman numerals in the front matter, and then arabic numerals in the main matter of the document (after the tables of contents, figures and tables). Tables and figures in the front matter are also numbered differently (Table A, B, C, ...) than in the main matter (Table 1, 2, 3, ...).

This change in page and float numbering is implemented using the `\frontmatter`, `\mainmatter`, and `\backmatter` commands at the start of these sections of the document:

```
\begin{document}

\maketitle
\frontmatter
...
\tableofcontents
\clearpage
\listoffigures
\listoftables
\mainmatter
...
\backmatter
\end{document}
```

Page numbering in the front matter (i.e. the Abstract, Summary, and Foreword chapters or sections) starts at page 3 to allow for cover pages.

If you don't use the `\frontmatter` commands, you may need to increment the page counter manually. To increment the counter n pages, use `\setcounter{page}{n}` after `\begin{document}`.

2.2.2 Cross references

Use labels and references to refer back and forth to figures, equations, tables and sections.

For example, an equation can be added using the following text:

```
\begin{equation}
y = mx+c
\label{eqn:line}
\end{equation}
```

This gives the following:

$$y = mx + c \qquad (1)$$

And using the text `Eqn. \ref{eqn:line}` provides a cross reference to Eqn. 1.

2.2.3 Floats

Floats are images, tables or other pieces of the document that are free to move to the best place in the document for them. The two most common floats are the tabular environment (for tables) and the figure environment for figures.

Use the `tabular` environment to produce basic tables. Table 2 is produced using this code:

Table 1. Packages loaded by the Corporate classes.

Package	Options	Functionality
amsfonts, amssymb		supplies AMS fonts, which are useful for mathematics
babel	english	activates language-appropriate hyphenation rules
booktabs		improves the formatting of tables
caption		required to generate captions for floats
courier		changes fonts
fontenc	T1	enables direct typing of international characters
geometry		sets page size and margins
graphicx		graphics handling, including *.eps* figures
hyphenat		improves spacing and breaking of hyphenated words
listings		enables the inclusion of high-quality computer code listings
mathptmx		changes fonts
nag		checks that packages are up to date and looks for bad habits in LaTeX code
opensans	scaled=0.95	sets Google's *Open Sans* as the default font
parskip		required for better spacing
pdfcomment		required for tool-tips. Also calls the `hyperref` package.
setspace		required for better spacing
subcaption		provides the `subfigure` environment to produce sub figures
tocloft		improved table of contents and list of figures/tables in memoir documents
tocbibind	nottoc, notlot, notlof	Adds bibliography, index, and contents entries to the Table of Contents in memoir documents
todonotes		inline and margin to-do notes
xcolor		Driver-independent color extensions for LaTeX and pdfLaTeX

```
\begin{table}[!h]
\centering
\caption{An example table.}\label{tab:widgets
    }
\begin{tabular}{lr}
Item & Quantity \\
\hline
Widgets & 42 \\
Gadgets & 13
\end{tabular}
\end{table}
```

Table 2. An example table.

Item	Quantity
Widgets	42
Gadgets	13

If all of the delimiters (&) are included in each row, the table will be complete and will produce a better PDF.

To include a figure in a document, use the `figure` environment and the `includegraphics` command.

```
\begin{figure}
\includegraphics[width=\textwidth]{figure's-
    file-name}
```

```
\caption{Caption goes here.}\label{fig:
    figuresLabel}
\end{figure}
```

Subfigures are implemented using the `subcaption` package. The example below generates Figure 1.

```
\begin{figure*}
        \centering
        \begin{subfigure}[t]{.45\linewidth}
                \centering
                \includegraphics[height=2in
]{../DemoFiles/21206}
                \caption{Wind turbines at the
 Forward Wind Energy Center in Fond du
Lac and Dodge Counties, Wisconsin. (Photo
 by Ruth Baranowski / NREL)}\label{fig
:21206}
        \end{subfigure}%
        \hfill
        \begin{subfigure}[t]{.45\linewidth}
                \centering
                \includegraphics[height=2in
]{../DemoFiles/20018}
                \caption{Aerial view of the
National Wind Technology Center. (Photo
by Dennis Schroeder / NREL)}\label{fig
:20018}
```

```
    \end{subfigure}
    \caption{Images}\label{fig:NRELimages
}
\end{figure*}
```

Note that the `subfig` and `subfigure` packages are deprecated. The `subcaption` package appears to be the most frequently maintained package at this time, and contains the same functionality as the `subfig` and `subfigure` packages.

2.2.4 Including computer code

The `listings` package has been loaded. Note: this does not work if the 'Draft' document option is used.

To insert code with syntax highlighting, you can use the `lstlisting` environment, for example `\begin{lstlisting} ...\end{lstlisting}`.

You can change the language that is used to control the syntax highlighting using `\lstset{language=[dialect]language}`. For example, this document uses…

```
\lstset{language=[LaTeX]Tex,columns=
    fullflexible,keepspaces=true,breaklines=
    true}
```

… because most of the code is LaTeX. This can be changed for each block of code, however (and should be changed back afterwards). For example, the next block of code is written in C.

```
/* Hello world in C* */

#include <stdio.h>

main()
{
    printf("Hello␣World!\n");
}
```

For more details see the `lstlisting` documentation or the wikibook.

2.2.5 Citations

Use `bibtex` to organize references and store them in a single file (e.g. `/Documents/bibliography/bibliography.bib`). The bibliography will then contain entries with 'keys' for each source, like `Lamport_1986_a`.

Authors can then insert citations to this key throughout their document, using different styles of citation.

Citations are generated using the `biblatex` package, which also formats references in the correct style. Ways to generate citations are described in the `biblatex` documentation, and include:

- `\cite{Lamport_1986_a}` prints Lamport 1986.

- `\citep{Lamport_1986_a}` prints (Lamport 1986).

- `\citet{Lamport_1986_a}` prints Lamport (1986).

To cite URLs, use the 'misc' style. For example, the bibtex entry for http://tex.stackexchange.com (Anon. 2014) looks like this:

```
@misc{texstackexchange,
    Author = {Anon.},
    Howpublished = {Accessed July 21,
  2014: \url{http://tex.stackexchange.com
}},
    Title = {\TeX -- LaTeX Stack Exchange
},
    Year = {2014}}
```

This format will allow you to include the date on which a URL was accessed.

The citations should work with journal articles (Clifton et al. 2013), books (Knuth 1984; Lamport 1986; Turibain 1982), technical reports (Other and Nother 2014), and URLs (Anon. 2014). Any unknown publication types will be formatted using the 'misc' type.

2.2.6 Bibliographies

This document class uses "Chicago A" style-references produced using Biblatex. The reference style can be changed in the *CorporateArticle.cls* file.

To include a bibliography in the document give the bibliography file location in the preamble and insert the bibliography at the appropriate location:

```
% give the bibliography file location
\bibliography{files/bibliography.bib}
...
\begin{document}
...
% insert the bibliography into the document
\cleardoublepage
\label{sec:Bib}
\printbibliography
...
\end{document}
```

An example bibliography is included in this document on page 6.

(a) Wind turbines at the Forward Wind Energy Center in Fond du Lac and Dodge Counties, Wisconsin. (Photo by Ruth Baranowski / NREL)

(b) Aerial view of the National Wind Technology Center. (Photo by Dennis Schroeder / NREL)

Figure 1. Images

2.2.7 Footnotes

Footnotes can be inserted using the `\footnote{}` command[1]. Footnotes are numbered in the main matter[2], and use daggers, etc instead of numers in the appendices.

2.3 Creating a file structure

Your main file should be called *main.tex*. This helps editors and coauthors identify where to start. Then, use `input` to import other files into your main file at compilation.

For example, each of the chapters in this report is in separate files, called *WhatIsLatex* (Chapter 1), *LatexForDocs* (Chapter 2), and so-on. In the example available on Github, they are stored in the *files* directory. *main.tex* then looks like this:

```
...
\begin{document}
% content
\input{files/WhatIsLatex}
\input{files/LatexForDocs}
...
```

2.4 Best practice in writing a document in LaTeX

Create a structure before you get too far. Authors will find it easier to write documents and make changes if they separate the content of the document from the structure.

1. Each new LaTeX document should be placed in it's own directory.

[1] like this
[2] and like this as well

2. Create a main LaTeX file that just contains the preamble, custom commands and uses `input` to call the content. See Section 2.3 for an example where each `chapter` is contained in its own file. In an article, each `section` could be contained in its own file.

3. Keep the number of packages used to a minimum. Not all packages can be used as they lack compatibility.

Focus on content, not appearance. Don't spend hours trying to adjust fonts, headers or spacing between lines.

1. Don't throw in lots of `clearpages` or other commands to push material around. LaTeX is designed to handle that.

2. Resist the temptation to add or subtract space, change lengths or do other things to modify the layout.

3. Write!

3 Preparing an Accessible PDF from LaTeX

Care has to be taken to produce a PDF that meets best practice for accessibility. This may require special steps such as tagging, alt-text, and embedding fonts for documents that will be used with electronic document readers.

3.1 PDF tagging

PDF tagging is a process whereby the components of the PDF document (headings, figures, tables, text) are marked so that a document reader can understand the document. This is useful when text to speech

converters are being used. The process of tagging is also known as structuring, so that a tagged document might also be referred to as a structured document[3].

LaTeX does not prepare a structured PDF document directly.

At this time tags cannot be added reliably within LaTeX. Instead, they should be added after the PDF is compiled using a PDF editor such as Adobe's Acrobat Pro.

3.2 Alternative text

Alternative text, or 'Alt text', is a textual description of an equation, link or figure that can be used to replace the visual information in that element. This is often seen as a text 'pop-up' in PDF readers.

At this time Alt text cannot be added reliably withing LaTeX. Instead, it should be added after the PDF is compiled using a PDF editor such as Adobe's Acrobat Pro.

3.3 Embedded fonts

All fonts should be embedded in the the final PDF. Check the PDF for embedded fonts using a PDF viewer. For example, in Adobe Acrobat Reader, look at the 'fonts' tag of the document properties. If any fonts are not shown as being an *embedded subset*, try the conversion again.

Encapsulated postscript figures are particularly prone to having undefined fonts. Check by compiling the document in draft mode, and seeing if the fonts are still present in the output PDF. To fix this problem, change *.eps* files to *.png* files. To do this 'on the fly', use this in the document's preamble:

```
\usepackage{epstopdf}
\epstopdfDeclareGraphicsRule
 {.eps}{png}{.png}{convert eps:\SourceFile.\
    SourceExt png:\OutputFile}
\AppendGraphicsExtensions{.png}
```

Acknowledgments

This document is based on the NREL LaTeX class files developed by the author and then forked for this project.

I wish to thank members of the TeX – LaTeX StackExchange site for useful suggestions concerning LaTeX and typography (Anon. 2014).

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[3]This is a test

This report was typeset using the LaTeX typesetting system originally developed by Leslie Lamport, based on TeX created by Donald Knuth.

References

Anon. 2014. *TEX– LATEXStack Exchange*. Accessed July 21, 2014: http://tex.stackexchange.com.

Clifton, A., L. Kilcher, J.K. Lundquist, and P. Fleming. 2013. "Using machine learning to predict wind turbine power output." *Environmental Research Letters* 8 (2): 024009. doi:10.1088/1748-9326/8/2/024009.

Knuth, Donald E. 1984. *The TEXbook*. Addison-Wesley.

Lamport, Leslie. 1986. *LATEX: A Document Preparation System*. Addison-Wesley.

Other, A. N., and Y. A. Nother. 2014. *A technical report*. Tech. rep. A Very Important Laboratory.

Turibain. 1982. *The Chicago Manual of Style*. Thirteenth. 400–401. University of Chicago Press.

A   How to Use Appendices

Appendices can be included in *Corporate*.cls* documents.

A.1 How to switch to appendixes

To switch to appendices, use the *appendix* command:

```
\appendix
\input{files/AppendixA}
\input{files/AppendixB}
```

A.2 Changes to Figure, Table, and Footnote Numbering

The following table (Table A.1) should have a different caption numbering style than Table 2. The table number should start with the appendix label (in this case A,) be followed by a period, and then be numbered. Numbering should restart in each new appendix.

Table A.1. An example table.

Item	Quantity
Widgets	42
Gadgets	13

The following table should use the same letter as Table A.1, but the number should be incremented by one.

Table A.2. An example table.

Item	Quantity
Widgets	42
Gadgets	13

Footnotes use symbols in place of numbers in the appendices*.

B   Including Multiple Appendices

This chapter is included to demonstrate that the *Corporate*.cls* file correctly formats a second appendix†.

B.1   Changes to numbering

The following table (Table B.1) caption should have a different numbering style than Table 2. Instead, the caption numbering style should be the same as Table A.1. Numbering in this chapter should start with B.

Table B.1. An example table.

Item	Quantity
Widgets	42
Gadgets	13

---

*this is a test
†this is also a test