

UNIVERSITY OF WATERLOO  
Software Engineering

A L<sup>A</sup>T<sub>E</sub>X DOCUMENT CLASS FOR  
WORK REPORTS

Acme Incorporated  
Burbank, CA

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April 26, 2003

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April 26, 2003

Dr. J. Atlee, Chair  
Software Engineering Department,  
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Dear Dr. J. Atlee:

**Re: Submission of my work term report.**

I have just completed my first work term, following my 1B term. Please find enclosed my first work term report entitled: “A  $\LaTeX$  document class for work reports” for the Software Widgets group at Acme Incorporated. My departmental manager was Rube Goldberg and our group was primarily involved with writing and testing of labour-saving software.

This report focuses on using the unofficial work report documentation class, `uw-wkrpt.cls`, and provides a sample document on which to base your own SE report. It is written for fellow classmates who have some working knowledge of  $\LaTeX$  and  $\TeX$ .

I have had no direct assistance from anyone. I do wish to thank Leslie Lamport and Donald E. Knuth for inventing such marvellous typesetting tools.

I hereby confirm that I have received no further help other than what is mentioned above in writing this report. I also confirm that this report has not been previously submitted for academic credit at this or any other academic institution.

Yours sincerely,

---

J. Random Hacker, 01234567

Encl.

## Contributions

I worked in the Software Widgets group, which consisted of 2 animators, 6 cartoon characters, 3 software developers and 2 testers. We were to design labour-saving computerised devices, for internal consumption. Being self-sufficient, we were involved in the research, design, implementation and testing for all our software widgets.

Over the course of four months, we created three of these widgets. I was responsible for writing software. I looked at the design specifications, and wrote test-suites and software to meet them. The testers would add to my rudimentary test suites, and report errors to me whenever a test failed.

From the experiences in creating documentation for my programs, I acquired expertise in  $\text{\LaTeX}$ , which I found to be an excellent typesetting system. Armed with this knowledge, I was able to use this wonderful document class which eases the typesetting of work reports, and follows the E&CE guidelines [1] and the Co-op student manual [2].

From this sample work report, anyone can create a report that looks good, and is easy to read. Acme will benefit, because they now have a document class to provide to future co-op students, thereby reducing the time they spend on formatting reports.

# Executive Summary

This document describes the use of the `uw-wkrpt.cls` document class in creating work reports. Written in the  $\text{\LaTeX}$  macro language, this document class is designed to typeset documents that conform to the University of Waterloo co-op student manual [2] requirements. The class has been generalised from the earlier `uw-ece-workreport` document class so that it may be used by students of any faculty. This particular report serves as an example for the University of Waterloo, Electrical and Computer Engineering work report guidelines [1]. Other example reports for other faculties are included with this package.

I also argue the advantages of using this document class over other more traditional ways of generating a report. I hope to convince the reader that using this technology is superior to writing the document in a WYSIWYG word processor.

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# 1 Introduction

This pretend report, written by an imaginary student, exists because I got sick of writing a report, and having to check my document over and over again for simple formatting errors. Now, I thought that a work report is useful due to its content; not because my Table of Contents did not have dot leading for page numbers. So, I turned to  $\LaTeX$  as my saviour.

I, Simon Law, implemented my first work report in  $\LaTeX$  in early December 2001. Unfortunately, I was feeling my way around and didn't implement my scheme very well. After learning how to create a document class, I have created this document class, which I now offer to you.

If you find a problem with this document class, or have suggestions to offer; please drop me a note. As well, patches and fixes are always welcome. You can find information on how to contact me in Appendix B.

## 2 Synthesis

### 2.1 Advantages

Using this class has a number of great advantages:

- You no longer have to worry about missing information. If you fill in all the information at the top of this document, your title page and all the important fields in your Letter of Submittal will be properly filled.
- Your references will be all correct. Your Table of Contents, List of Figure and List of Tables will be automatically generated. Citations and references will be done properly, and your bibliography will be automatically formatted in IEEE style.
- You can cross-reference other sections trivially, (*e.g.* One can find the introduction at §1, p.1).
- You no longer have to worry if your document looks good. You can ask the computer to worry about formatting and styles, without having to mess around with differing fonts (roman, **sans-serif**, **fixed**) or with differing styles (normal, **bold**, *italics*, underlined, *slanted*, SMALL-CAPS). You can concentrate on what you write, and are assured that your text will look great.
- Since the computer formats things for you, you can re-arrange sections trivially. Or you can define new styles to make global changes across the entire document.
- Math output is by far superior in L<sup>A</sup>T<sub>E</sub>X. You can write things like  $\sum_{i=1}^{\infty} \frac{1}{x}$  or:

$$\int_0^{\infty} \delta(x) dx = u(x) + C$$

### 2.2 What are T<sub>E</sub>X and L<sup>A</sup>T<sub>E</sub>X?

T<sub>E</sub>X was designed and implemented by Donald E. Knuth, the famous author of *The art of computer programming* [3]. Knuth, shown in Figure 1, decided to

create a typesetting language that would handle mathematical output beautifully. This was motivated by the fact that publishers would mangle the formulæ of his *magnum opus*. Now,  $\text{T}_{\text{E}}\text{X}$  is used by the mathematical, academic, and documentation communities to typeset beautiful documents. The  $\text{T}_{\text{E}}\text{X}$  language is designed to provide precise control for text layout.

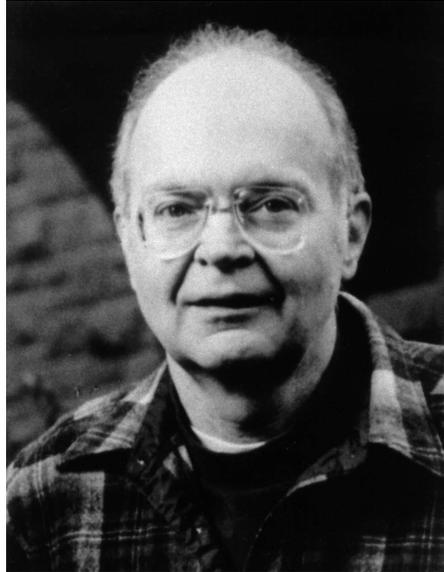


Figure 1: Donald E. Knuth, the creator of  $\text{T}_{\text{E}}\text{X}$ . [4]

$\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  was designed and implemented by Leslie Lamport while he worked at Digital Equipment Corp.  $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  was his attempt to create a documentation system that was easier to use than  $\text{T}_{\text{E}}\text{X}$ . In fact,  $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  is frequently called a “document processor” as opposed to a “word processor,” because it abstracts away the hard details of formatting and typesetting, allowing the author to use a semantic language to describe the output.

### 2.3 Learning $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$

Unfortunately, using  $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  is not quite as intuitive as using a word processor. However, if you invest the time in learning it, the payoffs can be great. Unlike a word processor,  $\text{L}_{\text{A}}\text{T}_{\text{E}}\text{X}$  is written like a markup language, which means you use macros<sup>1</sup> to tell  $\text{T}_{\text{E}}\text{X}$  how to typeset your document. This means that you

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<sup>1</sup>The SGML/HTML/XML world calls these tags.

can edit your documents in any old text editor, be it as crude as Microsoft Notepad, or something more heavy-duty like vi<sup>2</sup> [6] or Emacs [7].

There are some good on-line books if you wish to learn L<sup>A</sup>T<sub>E</sub>X without having to shell out any hard earned money<sup>3</sup>. The standard reference is *A not so short introduction to L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>* [8]. As well, *A simplified introduction to L<sup>A</sup>T<sub>E</sub>X* [9] is also an excellent reference.

The fundamental resource for learning L<sup>A</sup>T<sub>E</sub>X has to be *L<sup>A</sup>T<sub>E</sub>X: a document preparation system* [10] which is written by Leslie Lamport, the creator of L<sup>A</sup>T<sub>E</sub>X. Also of note is *The L<sup>A</sup>T<sub>E</sub>X companion* which is the next step up, if you want to become a power user.

How does one get a copy of L<sup>A</sup>T<sub>E</sub>X? On Unix systems, the t<sub>E</sub>X [11] distribution is popular. For Windows users, MiK<sub>T</sub>E<sub>X</sub> [12] is the distribution of choice. Follow each packages installation instructions for best results<sup>4</sup>.

You will probably want a PostScript interpreter to create PDFs or to send PostScript output files to the printer. You can use Adobe Distiller, which you can purchase from Adobe Systems Inc.; or you could download a copy of Ghostscript<sup>5</sup> [13].

### 2.3.1 How L<sup>A</sup>T<sub>E</sub>X works

You create text files that include L<sup>A</sup>T<sub>E</sub>X commands to generate the final document. You can consider it similar to writing source code that is compiled to generate the typeset output.

Figure 2 shows the control flow that a typical document follows in order to generate PDF output.

Since L<sup>A</sup>T<sub>E</sub>X is a programming languages, it does have some special characters. Specifically, the reserved characters are: #, \$, %, &, \_, {, }, ~, ^, \. See Table 1 to see them in print.

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<sup>2</sup>Try Vim [5] which is Vi Improved.

<sup>3</sup>You are earning money during this work term, right?

<sup>4</sup>On a Debian GNU/Linux system, invoke `aptitude install tetex-bin tetex-extra`

<sup>5</sup>Again, on Debian GNU/Linux, run `aptitude install gs`

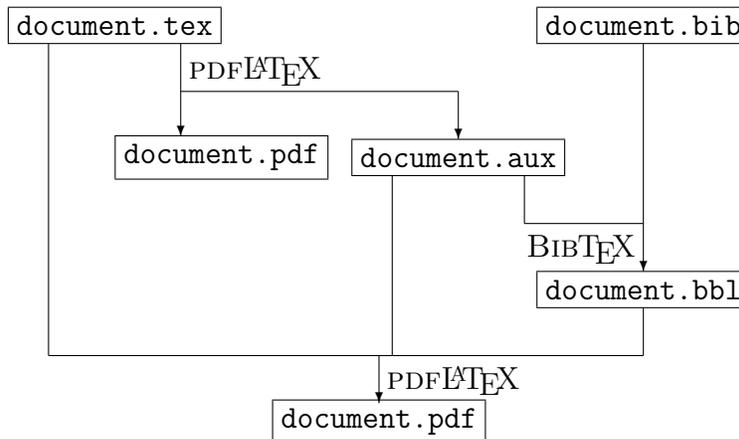


Figure 2: Control flow of a L<sup>A</sup>T<sub>E</sub>X compilation.

Table 1: Typesetting special characters.

Name	Symbol
octothorpe	#
dollar sign	\$
percent sign	%
ampersand	&
underscore	-
left brace	{
right brace	}
tilde	~
circumflex	^
backslash	\
inverted exclamation	!
inverted question	?
less than	<
greater than	>

## 2.4 Source

This document, and the documents it uses are available under the GNU General Public License (GPL), reproduced in Appendix C. Note that you do not need to accept the GNU GPL to use this document, or to use the document class. I highly recommend that you read the GPL so you understand your rights and privledges.

You can find the most recent version of these documents on my website in a tarball at: <http://www.eng.uwaterloo.ca/~sflaw/programs/uw-wkrpt/>. Download the latest version, unpack it, and read the enclosed `README` text file.

## 2.5 To do

There are still some things I want to do, to improve this example document:

1. Demonstrate the use of `GlossTEX` to create glossaries.
2. Demonstrate the creation of an index.
3. Look into `ieeetran.bst`.
4. Fix all the bugs listed in Appendix A.

Examples that illustrate this usage are most definitely welcome. Please provide a patch against this document.

### 3 Conclusions

Using this document class will allow you to reap the advantages of L<sup>A</sup>T<sub>E</sub>X, T<sub>E</sub>X and many years of labour donated by people much smarter than you or I. It is obvious that we should use their work to make ours that much better. For even the great Sir Issac Newton could only achieve what he did because he “stood on the shoulders of giants.”

## 4 Recommendations

Learn L<sup>A</sup>T<sub>E</sub>X and then use this document class to prepare your work reports.  
You will get nice, beautiful documents without a lot of fuss.

## References

- [1] W. M. Loucks PEng, G. H. Freeman, and J. A. Barby PEng, “E&CE work term report guidelines.” <http://www.ece.uwaterloo.ca/~wtrc/WrkTrmRpt.html> (current Aug. 2002).
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- [6] “VI lovers home page.” <http://www.thomer.com/vi/vi.html> (current Aug. 2002).
- [7] “GNU Emacs — GNU project — Free Software Foundation (FSF).” <http://www.gnu.org/software/emacs/emacs.html> (current Aug. 2002).
- [8] T. Oetiker, H. Partl, I. Hyna, and E. Schlegl, *The not so short introduction to L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub>: or L<sup>A</sup>T<sub>E</sub>X 2<sub>ε</sub> in 95 minutes*. 2001. <http://people.ee.ethz.ch/~oetiker/lshort/> (current Aug. 2002).
- [9] H. J. Greenberg, *A simplified introduction to L<sup>A</sup>T<sub>E</sub>X*. 2001. <http://carbon.cuderwer.edu/~hgreenbe/aboutme/simplified-intro.html> (current Aug. 2002).
- [10] L. Lamport and D. Bibby (Illustrator), *L<sup>A</sup>T<sub>E</sub>X: a document preparation system*. Reading, MA: Addison-Wesley, second ed., 1994.
- [11] “The teTeX homepage.” <http://www.tug.org/teTeX/> (current Aug. 2002).
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- [13] “ghostscript.com.” <http://www.ghostscript.com> (current Aug. 2002).

## Acknowledgements

I would like to thank J. Doe for proofreading this report.

I used the `uw-wkrpt` document class written by Simon Law to typeset it.

## A Bugs

Currently, there are some known problems with this document class.

- It is not officially supported or acknowledged by the E&CE department.
- Not all users have converted to using a typesetting language, and insist on using word processors.
- It does not bring world peace.

Fixes for these bugs are most certainly welcome. Please provide a patch against the document class document.

## B Colophon

This sample document was written by Simon Law, a third-year Computer Engineering student at the University of Waterloo, in Waterloo, ON, CA. When he is not programming, he can be found reading or sleeping; both of which are his favourite activities.<sup>6</sup>

The best way to contact him is by e-mail, at [sflaw@uwaterloo.ca](mailto:sflaw@uwaterloo.ca).

This document was implemented using the `ece` variant of the `uw-wkrpt` document class. The document class, and the surrounding documentation is implemented using the  $\text{\LaTeX} 2_{\epsilon}$  macro package which is built on the  $\text{\TeX}$  typesetting system. The documents were generated by the `web2c` implementation of  $\text{\TeX}$ , found in the `te\TeX` distribution. The typeface used is Computer Modern.

The entire system was written in the Vim text editor. The operating system used was Debian GNU/Linux which ran on an IBM ThinkPad A20m. This stalwart companion allowed him to work on this report periodically, even during his “off” time up at the cottage.

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<sup>6</sup>OK, so I don’t have a life yet. I’m working on it.

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*one line to give the program's name and a brief idea of what it does.*  
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Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

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Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type 'show w'.  
This is free software, and you are welcome to redistribute it  
under certain conditions; type 'show c' for details.

The hypothetical commands ‘show w’ and ‘show c’ should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than ‘show w’ and ‘show c’; they could even be mouse-clicks or menu items—whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program
‘Gnomovision’ (which makes passes at compilers) written by James Hacker.
```

```
signature of Ty Coon, 1 April 1989
Ty Coon, President of Vice
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