

Scholarship Skills

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L^AT_EX and B_IB_TE_X

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LaTeX

LaTeX is a very popular type-setting tool used by many computer scientists and mathematicians

- It has great support for type-setting mathematics (including a sophisticated macro system)
- It comes with supporting tools for managing bibliographic information – bibTeX
- Source is text and can be managed with Revision Control Systems like SVN and CVS
- Since source is text, tools can easily create input for tables and figures.
- It's open-source, and free.
- Web-based versions available: ShareLaTeX

Resources for LaTeX

- The most common version of LaTeX is pdf_latex.
- Online help for Latex
 - http://www.emerson.emory.edu/services/latex/latex2e/latex2e_toc.html
 - <http://tuq.org/texlive/>
 - <http://www.qiss.nasa.gov/tools/latex/>
 - <http://nwalsh.com/tex/texhelp/LaTeX.html>
 - <https://www.math.ucsd.edu/~wcheung/texforwindows.html>
 - Tex & LaTeX for mathmeticians on windows!
- Free online book on LaTeX
 - “The **Not So** Short Introduction to LaTeX2e”
 - By Tobias Oetiker. Hubert Partl, Irene Hyna and Elisabeth Schlegl
 - <http://www.ctan.org/tex-archive/info/lshort/english/lshort.pdf>

Markup Commands

- LaTeX is a *markup-language*
 - Text and commands are interspersed in the same document
 - Commands are alpha-strings preceded by a backslash
 - Commands can have *arguments* and options
 - Arguments appear inside { } . If a command has arguments you must supply them.
 - Options appear inside [] . Options need not be supplied (they have default values)
 - Examples
 - `\alpha`
 - `\begin{document}`
 - `\documentstyle[twoside]{report}`
 - `\begin{array}[t]{c}`
 - Many commands come in pairs
 - `\begin{centering}`
 - `\end{centering}`

CSE 569, Scholarship Skills, Week3a

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Basic Setup

```
\documentclass[12pt]{article}

\begin{document}

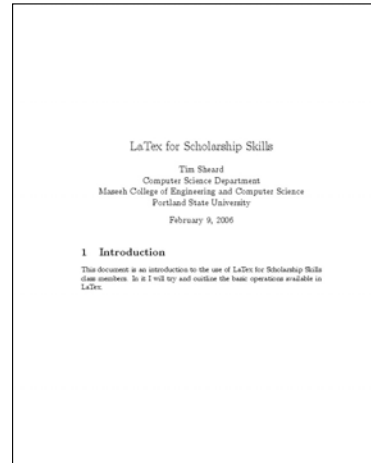
\title{LaTeX for Scholarship Skills}
\author{
Tim Sheard\\
Computer Science Department\\
Maseeh College of Engineering and
Computer Science\\
Portland State University\\
}

\maketitle

\section{Introduction}

This document is an introduction to the use
of LaTeX for Scholarship Skills class members.
In it I will try and outline the basic operations
available in LaTeX.

\end{document}
```



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Structure

Specifies what type of document and the default font size.

Every document begins with `\begin{document}` and ends with `\end{document}`

```
\documentclass[12pt]{article}

\begin{document}

\title{LaTeX for Scholarship Skills}
\author{
Tim Sheard\\
Computer Science Department\\
Maseeh College of Engineering and
Computer Science\\
Portland State University\\
}

\maketitle

\section{Introduction}

This document is an introduction to the use of LaTeX for Scholarship
Skills class members. In it I will try and outline the basic
operations available in LaTeX.

\end{document}
```

Title and author are specified with `\title{...}` and `\author{...}`

`\maketitle` tells where in the document the title should appear.

The `\section{...}` command introduces a new section whose name is ...

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Separating commands from text

In a LaTeX source file only certain characters are allowed.
All other characters are created in the output by using commands.

Allowed Characters

Upper Case Alpha: `ABCDEFGHIJKLMNOPQRSTUVWXYZ`

Lower Case Alpha: `abcdefghijklmnopqrstuvwxyz`

Digits: `0123456789`

Punctuation: `.:;,?!~'()[]-/*@`

Unless these characters are inside commands: if they are in the input, they will appear in the output.

Special Characters

Used only inside LaTeX commands: `#$%&~^{\}`

Used in Math Formulas: `+=|<>`

LaTeX Sources

```
\documentclass[12pt]{article}
\begin{document}
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
.:;,?!~'()[ ]-/*@
\# \$ \% \& \_ \{ \}
\verb+~+
\verb+^+ \verb+|+
\end{document}
```

delimiters

verbatim

```
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
.:;,?!~'()[ ]-/*@
#$%&~^{\}
```

Special characters
require special
commands to produce.

Itemized lists

My favorite things (in no special order) include:

```
\begin{itemize}
\item Red Cats.
\item Blue Pajamas
\item Pink Elephants
\end{itemize}
```

But, if I had to place them in order, it would have to be:

```
\begin{enumerate}
\item Pink Elephants
\item Red Cats.
\item Blue Pajamas
\end{enumerate}
```

My favorite things (in no special order) include:

- Red Cats.
- Blue Pajamas
- Pink Elephants

But, if I had to place them in order, it would have to be:

1. Pink Elephants
2. Red Cats.
3. Blue Pajamas

Labels and references

```
\documentclass[12pt]{article}

\begin{document}

\section{In the beginning}\label{alpha}

You have to start some where,
otherwise you'll never get to the end.
More about this in Section \ref{omega}.

\section{At the end}\label{omega}

When all is said and done, Id rather be
at the beginning (see Section
\ref{alpha}) than at the end.

\end{document}
```

1 In the beginning

You have to start some where, otherwise you'll never get to the end. More about this in Section 2

2 At the end

When all is said and done, Id rather be at the beginning (see Section 1) than at the end.

Footnotes

```
\documentclass[14pt]{article}

\begin{document}

There are lots of thing I
never learned in Scholarship
Skills \footnote{But, using
LaTeX wasn't one of them.}
that I haven't used since.
But I do not regret taking
the course\footnote{I
\emph{do} regret losing my
class notes!}.

\end{document}
```

There are lots of things I never learned in Scholarship Skills¹ that I haven't used since. But I do not regret taking the course².

¹But, using LaTeX wasn't one of them.
²I do regret losing my class notes!

Sectioning

```
\section{The Biggest Stuff}\label{A}
Sections are the largest
parts of an article.

\subsection{The Next Stuff}\label{B}
Sub-sections are slightly
smaller.

\subsubsection{Down A Bit More}\label{C}
Sub-sub-sections really divide
the text.

\paragraph{About at the bottom.}
Only sentences are smaller
than paragraphs.

\section{Discussion}

Biggest in Section \ref{A}.\
Next in Subsection \ref{B}.\
Down in Subsubsection \ref{C}.\
```

1 The Biggest Stuff

Sections are the largest parts of an article.

1.1 The Next Stuff

Sub-sections are slightly smaller.

1.1.1 Down A Bit More

Sub-sub-sections really divide the text.

About at the bottom. Only sentences are smaller than paragraphs.

2 Discussion

Biggest in Section 1.
Next in Subsection 1.1.
Down in Subsubsection 1.1.1.

Tables

separator *left* *center* *right*

```
\begin{tabular}{lcr} \hline
left & centered & right \\ \hline
big & little & small \\
Thomas & Richard & Harrison \\ \hline
\end{tabular}
```

left	centered	right
big	little	small
Thomas	Richard	Harrison

Try it without vertical rules:

```
\begin{tabular}{lcr}
left & centered & right \\ \hline
big & little & small \\
Thomas & Richard & Harrison \\ \hline
\end{tabular}
```

left	centered	right
big	little	small
Thomas	Richard	Harrison

Mathematics

```
\documentclass[14pt]{article}

\begin{document}
\[ x' + 2x^{2+y} =
\frac{z_{i-1} * w^{j+1}}{\sqrt{3m}} \]
\end{document}
```

$$x' + 2x^{2+y} = \frac{z_{i-1} * w^{j+1}}{\sqrt{3m}}$$

Inline Mathematics

Consider the coefficients a , b and c in the equation $ax^2 + bx + c =$



Consider the coefficients a , b and c in the equation $ax^2 + bx + c =$

Don't use
\$.. \$ to
make a term
italic
\$new term\$

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Begin typesetting math

Exponentiation by superscripting

The top part of a fraction

subscripting

The bottom part of a fraction

End typesetting math

`\[`
 $x' + 2x^{2+y} = \frac{z_{i-1} * w^{j+1}}{\sqrt{3m}}$
`\]`

$$x' + 2x^{2+y} = \frac{z_{i-1} * w^{j+1}}{\sqrt{3m}}$$

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Floating Figures

```
\section{Weather on Mars}
\begin{figure}
\hspace*{1in}
\begin{tabular}{|l|c|c|c|} \hline
& Today & Yesterday & Tomorrow \\ \hline
A & 356 & 22 & 18 \\ \hline
B & 851 & 456 & 129 \\ \hline
\end{tabular}
\caption{Temperature in degrees K, at sites A and B on Mars.}
\label{mars}
\end{figure}
```

In Figure \ref{mars} we report the temperature at A and B.

	Today	Yesterday	Tomorrow
A	356	22	18
B	851	456	129

Figure 1: Temperature in degrees K, at sites A and B on Mars.

1 Weather on Mars

In Figure 1 we report the temperature at A and B.

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Figures can be imported

\section{An Alternative to Textual Error Messages}

We have built a plugin for the Eclipse environment that addresses the problems with error messages that were revealed by the formative study.

The plugin is called Refactoring Annotations, ...

In general, Refactoring Annotations can be thought of as graphical error messages; specifically, the current plugin displays violated preconditions for the \refacName{Extract Method} refactoring.

\begin{figure}
\centering

\includegraphics[scale=\figureScale]{anns
OK}
\caption{Refactoring Annotations overlaid on program text.}

The programmer has selected two lines (between the dotted lines) to extract. Refactoring Annotations show how the variables will be used:

\texttt{front} and \texttt{rear} will be parameters, as indicated by the arrows into the code to be extracted, and \texttt{trued} will be returned, as indicated by the arrow out of the code to be extracted. \label{fig:annsOk}

\end{figure}

File in same directory as .tex file, or declare "graphicspath"

In file
annsOK:

```
boolean areWheelsTrue() {
    Wheel front = bike.getFrontWheel();
    Wheel rear = bike.getRearWheel();
    boolean trued = isWheelTrue(front);
    trued = trued && isWheelTrue(rear);
    return trued;
}
```

violated preconditions, programmers need expressive, distinguishable, and understandable techniques that convey the meaning of precondition violations; this is the focus of the remainder of this article.

3 AN ALTERNATIVE TO TEXTUAL ERROR MESSAGES

We have built a plugin for the Eclipse environment that addresses the problems with error messages that were revealed by the formative study. The plugin is called Refactoring Annotations, and can be downloaded from http://multiview.cs.pdx.edu/refactoring/refactoring_annotations. In general, Refactoring Annotations can be thought of as graphical error messages; specifically, the current plugin displays violated preconditions for the EXTRACT METHOD refactoring.

The programmer starts using the Refactoring Annotations tool by selecting some program text. Refactoring Annotations overlay the program text to express control- and data-flow information about the programmer's selection. Each variable is assigned a distinct color, and each occurrence of the variable is highlighted, as shown in Figure 3. Across the top of the selection, an arrow points to the first use of a variable whose value that will have to be passed as an argument into the extracted method. Across the bottom, an arrow points from the last assignment of a variable whose value will have to be returned. L-values have black boxes around them, while r-values do not. An arrow to the left of the selection indicates that control flows from beginning to end.

These annotations are intended to be most useful when preconditions are violated, as shown in Figure 4. When the selection contains assignments to more than one variable, multiple arrows are drawn leaving the bottom, showing multiple return values (Figure 4, top). When a selection contains a conditional return, an arrow is drawn from the

```
boolean areWheelsTrue() {
    Wheel front = bike.getFrontWheel();
    Wheel rear = bike.getRearWheel();
    boolean trued = isWheelTrue(front);
    trued = trued && isWheelTrue(rear);
    return trued;
}
```

Fig. 3. Refactoring Annotations overlaid on program text. The programmer has selected two lines (between the dotted lines) to extract. Refactoring Annotations show how the variables will be used: front and rear will be parameters, as indicated by the arrows into the code to be extracted, and trued will be returned, as indicated by the arrow out of the code to be extracted.

```
void goOnVacation() {
    Bike roadBike = getRoadBike();
```

Citations

```
\documentclass[14pt]{article}
\begin{document}

We studied four papers in lecture. The first, by
Scott\cite{Scott92}, is a book. Then second, by
Cambers and Leavens\cite{Chambers95}, is a journal
paper. The third, by Heiler and
Rosenthal\cite{Heiler85}, is a paper in a
proceedings. The last paper, by Dayal and
Smith\cite{Dayal85}, is in a collection of papers.


\bibliographystyle{plain}
\bibliography{myBib}


\end{document}
```

Result

We studied four papers in lecture. The first, by Scott[4], is a book. Then second, by Cambers and Leavens[1], is a journal paper. The third, by Heiler and Rosenthal[3], is a paper in a proceedings. The last paper, by Dayal and Smith[2], is in a collection of papers.

References

- [1] Craig Chambers and Gary T. Leavens. Typechecking and modules for multimethods. *ACM Transactions on Programming Languages and Systems*, 17(6):805–843, November 1995.
- [2] Umeshwar Dayal and John Miles Smith. PROBE: A knowledge-oriented database management system. In *On Knowledge Base Management Systems (Islamorada)*, pages 227–257. Springer-Verlag, 1985.
- [3] S. Heiler and A. Rosenthal. G-whiz, a visual interface for the functional model with recursion. In *Proc. Int'l. Conf. on Very Large Data Bases*, page 209, Stockholm, Sweden, August 1985.
- [4] Marla Scott. *Effective Programming in C*. Addison-Wesley, 1992.

References

References in LaTeX are kept in a .bib file.

Use bibTeX to create the text that goes in the reference section of the paper

The Mantra is:

latex paper

Creates the .aux file with a list of all citation keys

bibtex paper

Finds the references in .bib and creates text

latex paper

Inserts text for references

latex paper

Gets the cross references right, the second time.

Bibliographies with LaTeX

The bibfile stores all the data about individual papers.

Every paper is given a *key*.

The key used in the `\cite` command. This appears in the text of the paper.

`\cite{key}`

Black recommends the natbib package; natbib is a reimplementation of the LATEX `\cite` command, to work with both author-year and numerical citations. It is compatible with the standard bibliographic style files, such as plain.bst, as well as with those for harvard, apalike, chicago, astron, authordate.

Load with `\usepackage[options]{natbib}`.

\cite* commands

The natbib package has two basic citation commands, `\citet` and `\citep` for *textual and parenthetical citations, respectively*. There are also starred versions `\citet*` and `\citep*` that print the full author list, and not just the abbreviated one. All of these may take one or two optional arguments to add text before and after the citation.

<code>\citet{jon90}</code>	-->	Jones et al. (1990)
<code>\citet[chap. 2]{jon90}</code>	-->	Jones et al. (1990, chap. 2)
<code>\citep{jon90}</code>	-->	(Jones et al., 1990)
<code>\citep[chap. 2]{jon90}</code>	-->	(Jones et al., 1990, chap. 2)
<code>\citep[see][jon90]</code>	-->	(see Jones et al., 1990)
<code>\citep[see][chap. 2]{jon90}</code>	-->	(see Jones et al., 1990, chap. 2)
<code>\citet*{jon90}</code>	-->	Jones, Baker, and Williams (1990)
<code>\citep*{jon90}</code>	-->	(Jones, Baker, and Williams, 1990)

The bib file

The bib file stores all the data about individual papers.

Every paper is given a *key*, which is used in the `\cite{...}` command.

There are many kinds of references

We will look at 4 common kinds

Book, journal article, proceedings paper, collection paper

Other interesting ones are

web page, thesis and tech report. There are many others.

Not every style file implements all kinds of reference.

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Example bib file

```
%% This BibTeX bibliography file was created using BibDesk.
%% http://bibdesk.sourceforge.net/

@techreport{haines1993,
  Address = {Pittsburgh, Pennsylvania, United States},
  Author = {Nicholas Haines and Darrell Kindred and J. Gregory Morrisett and Scott M. Nettles and Jeannette M. Wing},
  Date-Added = {2011-05-02 08:46:26 -0700},
  Date-Modified = {2011-05-02 08:50:24 -0700},
  Institution = {School of Computer Science, CMU},
  Keywords = {transactions, threads, skeins, persistence, recovery, undoability, serializability, Standard ML, modules},
  Month = {December},
  Number = {CMU-CS-93-202},
  Title = {Tinkertoy Transactions},
  Year = {1993},
  Abstract = {We describe ... }}

@book{silber2005,
  Author = {Abraham Silberschatz and Peter Baer Galvin and Greg Gagne},
  Booktitle = {Operating System Concepts},
  Date-Added = {2011-03-22 17:04:57 -0700},
  Date-Modified = {2011-03-22 17:12:35 -0700},
  Edition = {Seventh Edition},
  Pages = {xv+886},
  Publisher = {Wiley},
  Title = {Operating System Concepts},
  Url = {http://www.cetlylive.com/wp-content/uploads/2010/11/Operating-System-Concepts-7-th-Edition.pdf},
  Year = {2005}}
...
```

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Book

```
@Book{Scott92,
  author = "Marla Scott",
  title = "Effective
          Programming in {C}",
  year = "1992",
  publisher = "Addison-Wesley"
}
```

preserve capitalization

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Journal Article

```
@Article{Chambers95,  
  author =      "Craig Chambers and Gary T. Leavens",  
  title =      "Typechecking and Modules for  
                Multimethods",  
  journal =     "ACM Transactions on  
                Programming Languages  
                and Systems",  
  volume =     "17",  
  number =     "6",  
  pages =      "805--843",  
  month =      nov,  
  year =       "1995"  
}
```

Proceedings paper

```
@InProceedings{Heiler85,  
  author =      "S. Heiler and A. Rosenthal",  
  title =      "{G}-Whiz, a Visual Interface for  
                the Functional Model  
                with Recursion",  
  booktitle =   "Proc. Int'l. Conf. on Very Large  
                Data Bases",  
  pages =      "209",  
  address =     "Stockholm, Sweden",  
  month =      aug,  
  year =       "1985",  
  keywords =    "VLDB",  
}
```

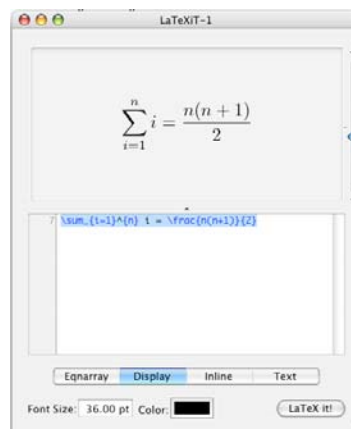
Collections paper

```
@InCollection{Dayal85,
  title =      "{PROBE}: {A} Knowledge-Oriented
                Database Management System",
  author =     "Umeshwar Dayal and John Miles Smith",
  editor =     "Michael L Brodie and John Mylopoulos",
  year =       "1986",
  booktitle =  "On knowledge base management systems:
                integrating artificial intelligence and
                database technologies",
  publisher =  "Springer-Verlag",
  address =    "New York",
  pages =      "227--257",
}
```

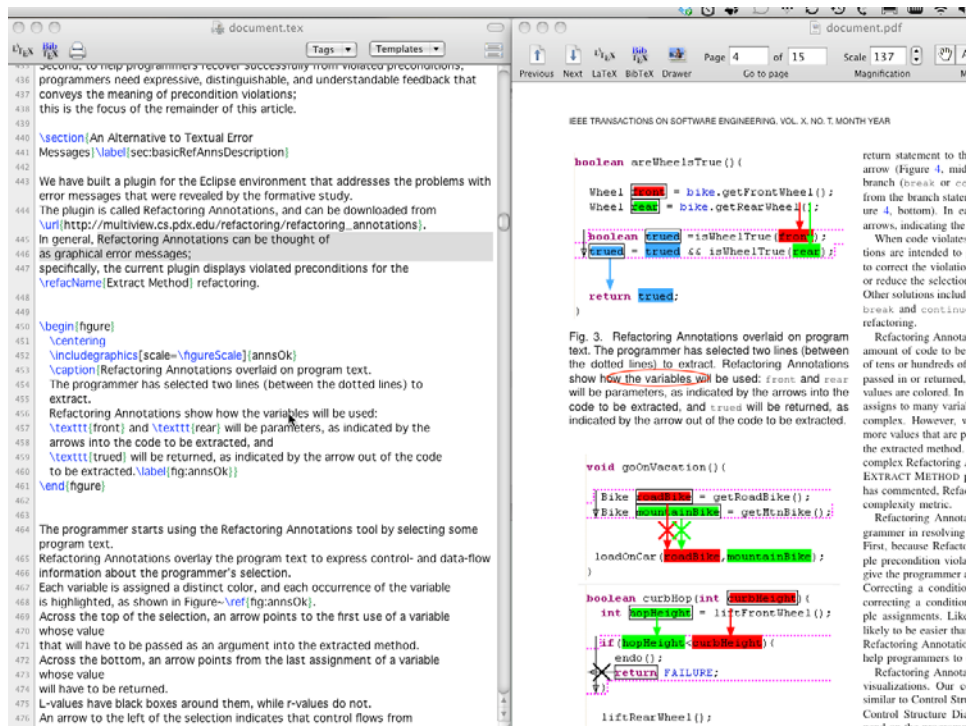
Note that @inbook would not work, because it won't allow both author and editor. @inbook is for *chapters* of a book.

LaTeX on the Macintosh

- TeXShop — freeware dual-view text editor and pdf previewer
- LaTeXIT — lets you type fragments of math, typeset them, and paste into another application, like Keynote or PowerPoint.



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Scholarship Skills Tex and LaTeX for windows

UCSD Mathematics: TeX/LaTeX for Microsoft Windows - Mozilla Firefox

File Edit View History Bookmarks Tools Help

ucsd.edu https://www.math.ucsd.edu/~wcheung/texforwindows.html

UCSD Mathematics: TeX/LaTeX for Microsoft Windows

If you want a TeX/LaTeX typesetting system for your own personally-owned Microsoft Windows computer like the one used on the UCSD Mathematics Department computers, the application programs you need are:

1. **MkTeX** - TeX/LaTeX system (FREE)
<http://www.miktex.org/>
2. **WinEdT** - TeX-aware text editor and Windows GUI frontend/IDE shell (SHAREWARE)
<http://www.winedt.com/>
3. **Adobe Reader** - PDF file viewer (FREE)
<http://www.adobe.com/>
4. **Ghostscript** - PostScript language interpreter (FREE)
<http://www.cs.wisc.edu/~ghost/>
5. **GSview** - PostScript file viewer (uses Ghostscript) (FREE)
<http://www.cs.wisc.edu/~ghost/gsview/>

Done Tor Disabled