

# Introduction to LATEX

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# Presentation Organization

- LATEX: what, why, and how
- Document basics
- LATEX software
- Tex file structure
  - Preamble: margin & head/foot
  - Body: TOC, text, table, figure, math formulas
  - Bibliography
- LATEX for resumes: **moderncv**
- JMU thesis template
- LATEX for presentation slides

# Presentation Road Map

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# What is LATEX?

- Also written as **LaTeX**
  - Pronounced as /leɪtɛk/ or /ləːtɛk/
- A document **markup language** and document preparation system
  - Based on **TeX** typesetting
    - **TeX**: Greek  $\tau\epsilon\chi$
    - Creator: Donald Knuth
  - **LATEX**: Leslie **L**amport and **TEX**
    - Originally written in the early 1980s by Lamport at SRI International

# Why LATEX?

- Wait, isn't **Microsoft Word** enough?
- How about **OpenOffice**?
- Documents produced by LATEX look more professional (than Word and OpenOffice)
  - Subjective: it is an issue of flavor
- It is free: work on Windows and Unix

# LATEX vs. Word: Pros & Cons

## Pros of LATEX

- Large documents
  - 15 pages or more
  - White papers, technical papers, reports, books
- Print press quality
- Bibliography management
- Math typesetting
- Robustness of templates
- Running numbers: automatic
- Internal reference
  - Table 1.1, Figure 1.1, Section 1.1 shows that ...

## Pros of MS Word

- Easy to
  - Add head/foot
  - Add an empty line
  - Change font
  - Change margins: **too easy (& fragile)!**
  - Insert a picture
  - Insert a table
- Easy to use
  - LATEX has a steep learning curve

All these can be learnt in  
LATEX

# The Cons of MS Word

- Bibliography
  - Bibliography organization is much easier in LATEX: important for technical papers!
  - RefWorks and EndNotes help Word but not flexible as Bibtex
- Math typesetting
  - Hard; MathType helps but not good enough
- MS Word templates are **too fragile!**
  - Easy to screw up paper layout, table of content, ...
- Tables/figures
  - **Numbering** tables/figures automatically
  - Automatically **refer** to a floating table/figure

# Something that are Harder for LATEX Beginners

- Add head/foot
- Change layout: width, height, margins
- Change font
- Insert a picture
  - Figures
  - MS project schedule, MS Visio figures
- Insert a table
- **Version tracking**
- **Cooperative work (team work)**
- These tasks are just harder, but still manageable in LATEX

Something are really straightforward in MS Word but not for LATEX beginners

A few things will drive you crazy for a while



# Warning

- MS Word is what you see is what you get (**WYSIWYG**)
- What is special about LATEX?
  - It is more like HTML documents
  - A source file contains both commands and text
- The best way to learn LATEX is **by examples**

# Warning

**Easy in MS Word!**

- This may drive you crazy

**Advanced!**

- Advanced LATEX features; skip in your first round

**Trick!**

- Things making your life much easier

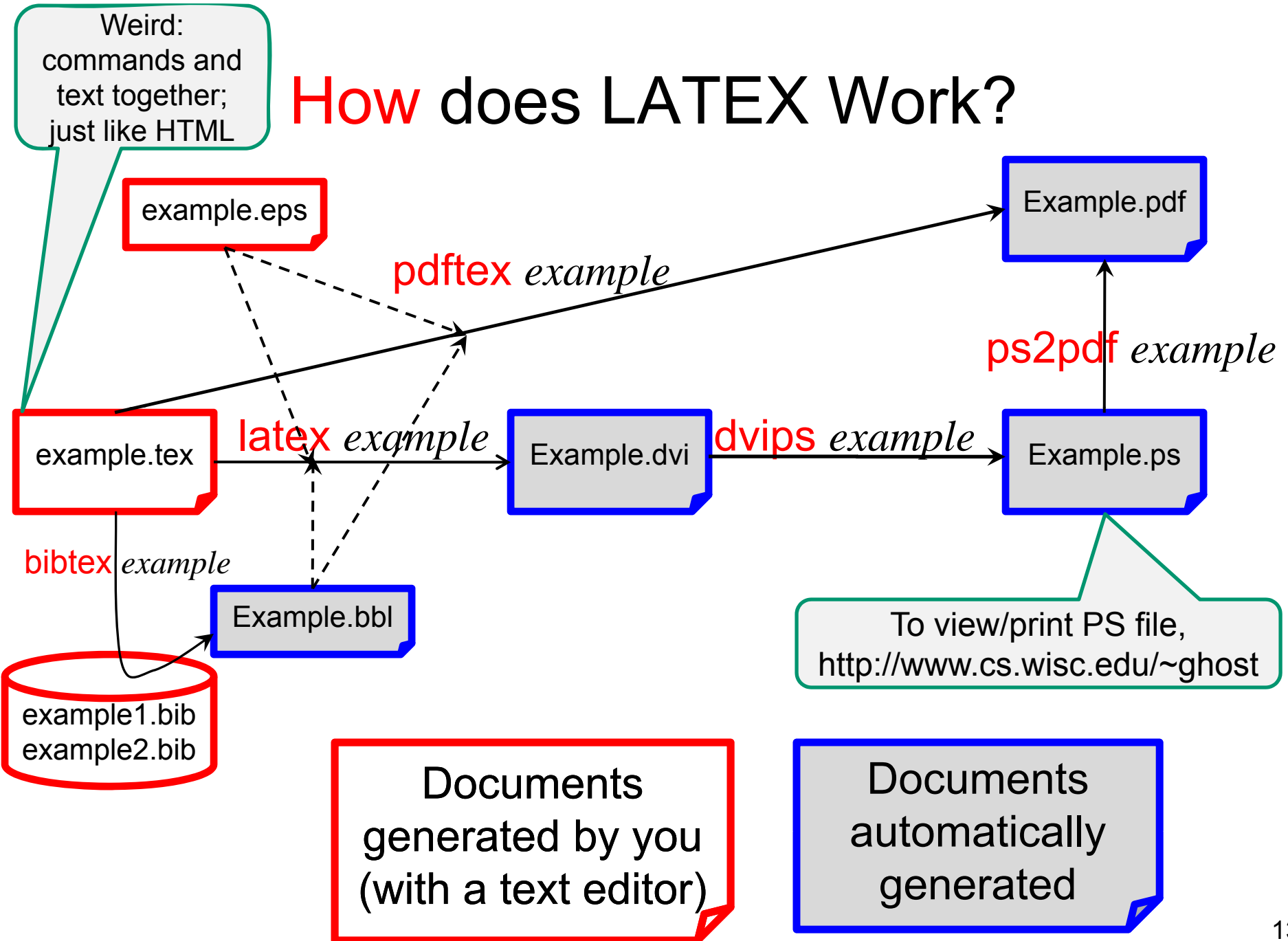
# Reminder

- Learning (LATEX) is **not** necessarily a bad thing
  - Especially for CS majors
- Many concepts will be made explicit
  - You will be surprised by the complexity of the print business
- You can **not** learn everything about LATEX in just one round
- Ignore those **Advanced features** first!

# What is a Markup Language?

- **Typographical** markup: bold, italic
- **Logical markup**:
  - Running heads
  - Sectioning
  - Tables of contents
  - Cross-referencing
  - Equation numbering
  - Floating tables and figures
  - Citations and bibliography
  - Indexing

# How does LATEX Work?



# LATEX File Types

- **.tex**: LATEX source file
- **.bib**: bibliography database files
- **.dtx**: document + code
- **.cls**: LATEX class file
- **.sty**: LATEX style file {package}
- **.dvi**: device-independent file

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# What Documents Are You Writing?

- A **book**?
  - Parts, chapters, sections, subsections
  - Even and odd pages are different
- A **report**?
  - Parts, chapters, sections, subsections
- An **article**? (a white paper, tech report, conference/journal paper)
  - (Parts,) sections, subsections
- A letter?
- **Presentation slides**?

All are supported by  
LATEX



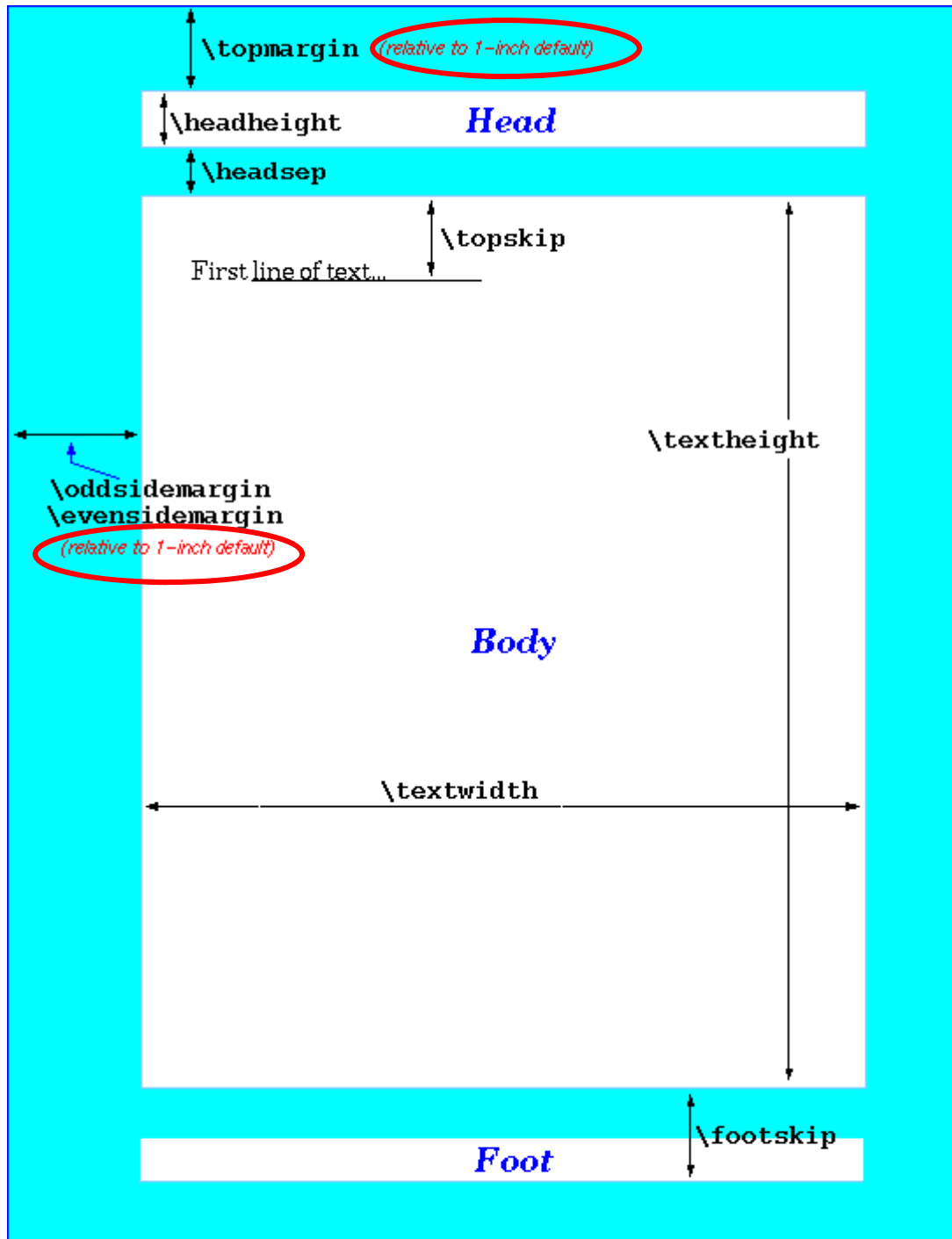
# Visual Presentation of Your Document

- Paper size? Not all papers have the same size
- Font size?
- Margins: top, bottom, left, right
- Want header/footer?
- Want a title page?
- What type of numbering: Arabic, Roman, or Alphabetic?

# A4 vs. Letter Paper

	INCH/CENTIMETER		NOTE
Letterpaper	11	8.5	1 inch = 72 pt 1 inch = 2.54 <i>cm</i>
	27.94 <i>cm</i>	21.59 <i>cm</i>	
A4	11.693	8.27	
	29.7 <i>cm</i>	21 <i>cm</i>	

- A4 paper is narrower but taller
  - Used in Europe



# Page Layout

- A page may or may not have **Head**
- **Foot** is often page number

# PDF Version

ACROBAT VERSION	PDF VERSION	YEAR
3.0	1.2	96
4.0	1.3	99
5.0	1.4	01
6.0	1.5	03
7.0	1.6	05

# Portable Postscript/PDF

- **Use type 1 scalable fonts, instead of type 3 bitmapped fonts**
  - `dvips -Ppdf -G0` {shift lower characters to high position, **turn if off!!!**} `-t letter`
  - `dvips -Pcmz -G0`
- **Embed the fonts and set the compatibility level**
  - `ps2pdf -dMaxSubsetPct=100 -dCompatibilityLevel=1.2 -dSubsetFonts=true -dEmbedAllFonts=true`
- What does it mean?
  - One had better submit PDF file (the organization may incorrectly convert the PS file to PDF)
  - For NSF, using DVI format; NEW: upload the PS file and it will convert it very well
- Printing slides in 2-page-up format with a border around each slide:  
`psselect -r slides.ps | psnup -2 -pletter -b10 -d4 > slides.ps2`
- <http://www.cs.wisc.edu/~ghost/>

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# LATEX Software on Linux & Windows

- **Linux:** LATEX is available as a package
- Windows?
- **TeXLive:** free
- Within **cygwin**
  - <http://www.cygwin.com>
- FPTEX: Web2C
  - <http://www.fptex.org/fptexli2.html>
  - Burn your CD
    - <ftp://ftp.tex.ac.uk/pub/tex/systems/texlive/Images/>
- TEX User Group (TUG):  
<http://www.tug.org/>,  
<http://www.ctan.org/>,  
<http://ctan.tug.org/>

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# LATEX `.tex` Document Structure

- Preamble and body

- ① Preamble: collections of commands

- Paper format
    - Height and width of text
    - Form of the output page with its pagination
    - Automatic page headers and footlines

Visual presentation of your document

- ② Body:

- `\begin{document}`
    - ...
    - `\end{document}`

The content: what you really want to write here

# Presentation Road Map

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## • Tex file structure

### ① Preamble: margin & head/foot

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# .tex Preamble (1/3)

- Define how your document will look like
- `\documentclass[options]{class}`
- ① *class*: book, report, article, letter, slides, proc,
  - You can define your own; usually complex

# .tex Preamble (2/3)

## ② *options*

- Font size:: 10pt (**by default**), 11pt, 12pt
- Paper size: **letterpaper** (**by default**, American letter 11× 8.5in), **legalpaper**, **executivepaper**, **a4paper**, **a5paper**, **b5paper**
  - portrait mode (**by default**)
  - **landscape** mode
- Page format:
  - **onecolumn** (**by default**)
  - **twocolumn** (`\columnsep`, `\columnseprule`)
  - **oneside** (by default)
  - **twoside** (page numbers display on the right on even pages, on the left on odd pages)
  - `ppenany`: affect books
  - `openright`: will insert blank pages, if necessary

## .tex Preamble (3/3)

- Page format (cont):
  - **notitlepage**: affect book/report; by default, they have a separate title page
  - **titlepage**: affect article; **by default**, it does **not** have a separate title page
- Other options
  - leqno
  - fleqn
  - openbib
  - draft
  - Final
- Add **new features** with **packages**:
  - **Class decides format; packages add additional**
  - **\usepackage**[opt1,opt2...]{package1,package2}

# Preamble: Page Style (1/4)

- Head and foot: `\pagestyle{style}`
  - `plain`: empty *head*, centered page number *foot*
  - `empty`: no page number
  - `headings`: **default for book**; *head* with page # and title; empty *foot*
  - `myheadings`: same as headings except the head part
    - `\markright{right_head}`
    - `\markboth{left_head}{right_head}`
- `\thispagestyle{style}`: only affect the current page
- By default, only the **head line** has a rule
  - You can turn on the **foot line** rule
  - `\renewcommand{\footrulewidth}{0.4pt}`

# Preamble: Page Style (2/4)

- Page numbering: `\pagenumbering{num_style}`
  - `arabic` (`by default`, numbers)
  - `roman` (low-case Roman numerals)
  - `Roman` (upper-case Roman numerals)
  - `alpha`; (low-case letters)
  - `Alpha` (upper-case letters)

# Preamble: Page Style (3/4)

- Want fancy head and foot?

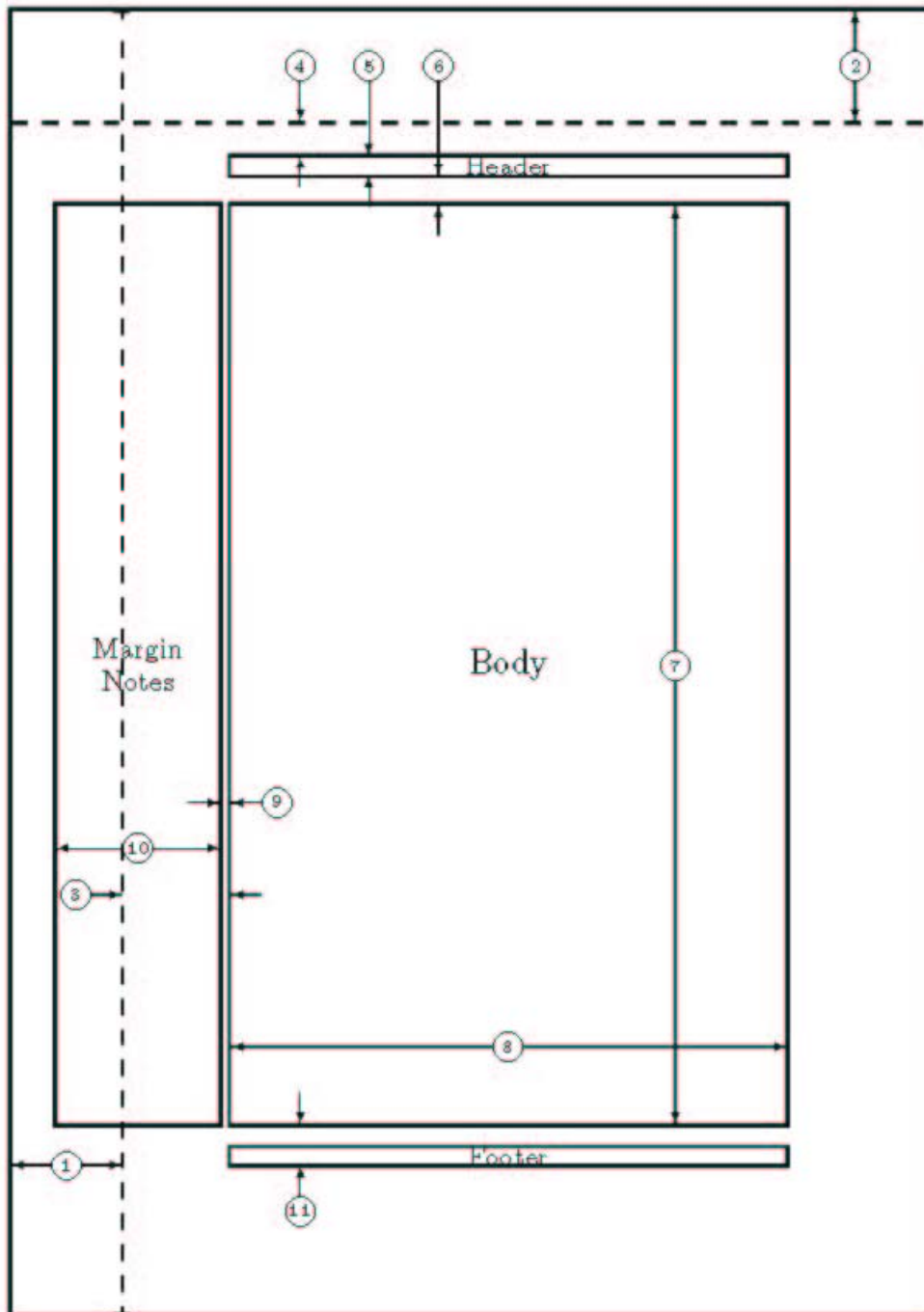
```
\usepackage{fancyhdr}
\pagestyle{fancy}
\lhead{your-left-head-text}
\chead{your-center-head-text}
\rhead{your-right-head-text}
\lfoot{your-left-foot-text}
\cfoot{your-center-foot-text}
\rfoot{your-right-foot-text}
```

- `\today`, `\thepage`
- If `fancyhdr.sty` does not work with `hyperref.sty`, check if you have a local copy of either of them!



# Preamble: Page Style (4/4)

- How do you want your sections numbered?
- Automatic?
- Customization?
- `\setcounter{page}[page_num]`
  - Part
  - Chapter
  - Section
  - Subsection
  - Subsubsection
  - Paragraph
  - Subparagraph
  - Page
  - Equation
  - Figure
  - Table
  - Footnote
  - Mpfootnote



- **11** = Advanced!  
 $\{1\text{in} + \backslash\text{voffset}\} +$   
 $\backslash\text{topmargin} \{1\text{in}\} +$   
 $\backslash\text{headheight} \{13\text{pt}\} +$   
 $\backslash\text{headsep} \{19\text{pt}\} +$   
 $\backslash\text{textheight} \{595\text{pt}\} +$   
 $\backslash\text{footskip} \{27\text{pt}\} +$   
**bottom margin**
- **8.5** =  
 $\{1\text{in} + \backslash\text{hoffset}\} +$   
 $\backslash\text{oddsidemargin} \{22\text{pt}\} +$   
 $\backslash\text{textwidth} \{360\text{pt}\} +$  **right margin**

Pretty complex!

# Page Layout: The Difficult Way

- In most cases, you will use default values
  - `\topmargin`
  - `\headheight`
  - `\headsep`
  - `\topskip`
  - `\textheight`
  - `\textwidth`
  - `\oddwidemargin`
  - `\evenwidemargin`
  - `\footskip`
- `\setlength`*{the above command}{value}*

Trick!

## Trick: How to Set the Margins?

- `\usepackage[left=1.0in,right=1.0,top=1.3in,bottom=1.0in]{geometry}`
- Note that
  - `top = \topmargin + 1in`
  - `right = \oddsidemargin + 1in`
- `\usepackage[textwidth=6.5in,textheight=9.0in,left=1in,right=1in,top=1in,bottom=1in]{geometry}`

# Preamble: Page Format

- Single page format
  - `\twocolumn`[text]: text will be displayed on the top of the page
  - `\onecolumn`: will terminate the current two page setting
    - They always start a new page
    - When two columns terminate, two sides are not equal length

- `\usepackage{multicols}`
- `\begin{multicols}{num_cols}[header text][pre_space]`  
*Your text*  
`\end{multicols}`
- Up to 10 columns; can start in the middle of a page
- Two lengths: `\premulticols`, `\postmulticols`

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## ② Document **Body**: General Format

① Title page

② Abstract

③ Table of Content: **optional**

• List of Figures: **optional**

• List of Tables: **optional**

④ Sections

The most complex part

– Paragraphs, special characters, list, theorems, literals, program code, box, footnote

– Tables, pictures, math formulas

⑤ Bibliography, cross reference, index, glossary

⑥ Appendix: **optional**

# Document **Body** In a Glance

- ① Title page:  
`\begin{titlepage} ... \end{titlepage}` **or**  
`\title{Title text}`  
`\author{Author1\thanks{footnote here}\\Institute1\\Address1`  
`\and Author2\\Institute2\\Address2}`  
`\date{Date text}` // **by default** the current date will be printed out  
`\maketitle` // {for **book** and report, it will generate a separate page; for **article** it does not}
- ② Abstract: `\begin{abstract} ... \end{abstract}`
- ③ TOC? See next slides
- ④ Sections: `\part`, `\chapter`, `\subsection`, `\section`,  
`\subsubsection`, `\paragraph`, `\subparagraph`  
`\sec_command[short_title]{title}` // short\_title: TOC  
`\sec_command*{title}`
  - `\setcounter{secnumdepth}{num}`
- Appendix: `\appendix`



## ③ Table of Content

- `\tableofcontents`: print out the table of content
- One can add additional item **Advanced!**
  - `\addcontentsline{toc}{sec_name}{entry_text}`
  - `\addtocontents{toc}{entry_text}` //put any commands
- One can customize the depth of TOC by adding the following to preamble **Advanced!**
  - `\setcounter{tocdepth}{num}`

# MTC (1/2)

- How to enable chapter-based TOC?
- `\usepackage{minitoc} %%% minitoc, mtcoff`  
`\renewcommand{\mtctitle}{Chapter Contents}`  
`\setcounter{minitocdepth}{1}%%`
- After `\begin{document}`
  - `\dominitoc%`
  - `\dominilof%`
  - `\dominilot%`
- `\mtcaddchapter[List of Figures]`
- `\mtcaddchapter[List of Tables]`
- `\mtcaddchapter[Preface]`
  - Page header?
  - `\head, \chead, \rhead`
  - `\tfoot, \cfoot, \rfoot`
  - Automatic text, automatic numbering

## MTC (2/2)

- `\chead{Preface}`
- `\fancyhead[CO]{\leftmark} %%% \slshape`
- `\fancyhead[CE]{\leftmark} %%% % \rightmark %%  
\slshape`

# List of Figures/Tables

- Extremely simply!
- List of figures
  - `\listoffigures`
- List of tables
  - `\listoftables`

# Document **Body**: Road Map

- ① Title page
- ② Abstract
- ③ Table of Content: optional
  - List of Figures: optional
  - List of Tables: optional
- ④ **Sections**
  - Paragraphs, special characters, list, theorems, literals, program code, box, footnote
  - Tables, pictures, math formulas
- ⑤ Bibliography, cross reference, index, glossary
- ⑥ Appendix: optional

# Paragraph (1/3)

- By default, **no** indent for the first paragraph after section

Easy in MS Word!

- Changes?

- `\usepackage{indentfirst}`
- Indentation for other paragraphs
  - `\noindent`, `\indent`
  - `\setlength{\parindent}{space}`:  
`\setlength{\parindent}{0}`

- Spaces **between** paragraphs

Easy in MS Word!

- `\setlength{\parskip}{space}`
  - `\setlength{\parskip}{1.5ex}` `\bigskip`, `\medskip`, `\smallskip`
- `\vspace{space}`, `\vspace*{space}`: add extra space even new page happens

## Paragraph (2/3)

- Combinations: no indent for all, spaces between paragraphs
  - `\setlength{\parskip}{1.5ex}`
  - `\setlength{\parindent}{0in}`
- `\usepackage[parfill]{parskip}[2001/04/09]`

# Paragraph (3/3)

- **Baseline**: the line on which the letters sits
- **Double line?**
  - `\renewcommand{\baselinestretch}{factor}`
  - 2.0
- **Line breaking?**
  - `\\[space]`, `\\*[space]` {prevent new page}
  - `\linebreak[num]`
  - `\nolinebreak[num]` discourages line breaking {degree of discouragement}

**Easy in MS Word!**



# Double Spacing?

**Easy in MS Word!**

- `\def\baselinestretch{1.0}`
- `\def\setstretch#1{\renewcommand{\baselinestretch}{#1}\global\let\normalbasels=\baselinestretch}`
- `\setstretch{2}`

# Document Body (1/5)

Easy in MS Word!

- Spacing:
  - `\hspace{space}`: {1.5cm, 3em}
  - `\hspace*{space}`: insert spaces no matter what
  - `\hfill` (= `\hspace{\fill}`): push **both** sides to margins
    - Multiple?: even spaces
    - `\hspace*{\fill}`: insert no matter what
    - `\quad`: current type size
    - `\qquad`: twice as current type size
  - `\dotfill`, `\hrulefill`: like `\hfill`
  - `\vspace{}`, `\vfill`,
- Page breaking
  - `\pagebreak[num]`
  - `\nopagebreak[num]`
  - `\newpage`
  - `\clearpage`
- Word: left/right justification, comma, punctuation, V (breaking **ligature**, shelf/ful)

## Document Body (2/5)

- `\hspace{1cm}`
- `\hspace{1in}`
- `\quad`: insert current type size
- `\qquad`: insert twice as much
- `\hspace{3em}`: 3-letter-width
- `\hspace{\fill}`: push for both margins
  - `\hfill`
- `\hrulefill`
- `\hrulefill \hfill \hfill` {reduce the underline length}
- Draw a fixed-width **blank** line: `\rule{1in}{0.1mm}`

Easy in MS Word!

## Document Body (3/5)

- `\rule[lift]{width}{height}`
  - `\rule{1in}{0.1mm}`
  - `\rule{\textwidth}{0.1mm}`
- `\hspace{0em} \hrulefill \hspace{0em}`: **not** very good
- Word division:
- **hyphenation** `\-`: `man\ -u\ -script`
- Suppress hyphenation:
  - `\begin{sloppypar} ... \end{sloppypar}`

Easy in MS Word!

# Document Body (4/5)

- Paragraph mode
- Math mode
- LR (left-to-right) mode: `\mbox{}`; one cannot split it with line breaks
- Special character: `#`, `$`, `&`, `~`, `_`, `^`, `%`, `{`, `}`
  - How about `||`?
    - `$\|`
  - How about `<>`?
    - `\verb=<>=`
- Command
  - `\commandname[optional_argument]{mandatory_argument}`
  - \*-form: `\section*` (do not print section number)

**Easy in MS Word!**

# Document Body (5/5)

- **Environment:**
  - `\begin{environment}`  
...  
`\end{environment}`
  - Bold face type: `\bfseries`
  - Emphatic typeface (italic): `\em`
- **Declaration: change the meaning of parameters or commands**
  - `{\bfseries abc}`
  - `\setlength{\parindent}{0.5 cm}`
  - `\pagenumbering{roman}`
  - `\newcounter`, `\newlength`, `\setcounter`, `\thispagestyle`,  
`\newsavebox`, `\addtocounter`

# Length

- **Fixed length:**
  - `\setlength{\length_command}{length_spec}`
- **Rubber length:** can be stretched or shrunk
  - `\setlength{\parskip}{lex plus0.5ex minus0.2ex}`

# Special Characters (1/2)

- Spaces and carriage returns
- Quotation marks
  - Double quotation marks
  - Single quotes
- Hyphens and dashes: **hyphen** (father-in-law), **en dash** (33-36), **em dash** (punctuation, usually called dash); -, --, ---, \$-\$ (minus sign)
- Command characters: \#, \$, ~, \_, ^, %, {, }
- Special characters: § (\S), † (\dag), ‡ (\ddag), © (\copyright), ¶ (\P), £ (\pounds)
- Foreign letters (mainly European languages):
- Accents (diacritic marks):

**Easy in MS Word!**



# Special Characters (2/2)

Easy in MS Word!

- **Ligatures**: ff, fi, fl, ffi, ffl; **not** as individual letters, but as a single symbol
- **Date**:
  - \today
  - \day, \month, \year

# Text (1/3)

Easy in MS Word!

- Font
  - Font size: `\tiny`, `\scriptsize`, `\footnotesize`, `\small`, `\normalsize`, `\large`, `\Large`, `\LARGE`, `\huge`, `{\Huge text}`
  - Family: `\textrm{text}`, `\texttt{text}`, `\textsf{text}`
  - Shape: `\textup{text}`, `\textit{text}`, `\textsl{text}`, `\textsc{text}`
  - Series: `\textmd{text}`, `\textbf{boldface text}` [`{\bfseries text}`]
  - `\textnormal{text}`
- Emphasis: `\emph{}`, `{\em text}`

## Text (2/3)

Easy in MS Word!

- Centered text:
  - `\begin{center} ... \end{center}`
  - `\centering`: within an environment
  - `\centerline{text}`: single line
- One-sided justification:
  - `\begin{flushleft} ... \end{flushleft};`  
`raggedleft`
  - `\begin{flushright} ... \end{flushright};`  
`raggedright`
- Two-sided **indentation**:
  - `\begin{quote} ... \end{quote}`
  - `\begin{quotation} ... \end{quotation} {extra indentation for the first line}`
- `\begin{verse} ... \end{verse}`

# Text (3/3)

Easy in MS Word!

- Not as easy as MS Word
- **ulem** package
  - % `\uline{important}` underlined text
  - % `\uuline{urgent}` double-underlined text
  - % `\uwave{boat}` wavy underline
  - % `\sout{wrong}` line drawn through word
  - % `\xout{removed}` marked over with `/////`.
  - % `{\em phasizedV}` | In LaTeX, by default, these are underlined; use
  - % `\emph{asized}` | `\normalem` or `[normalem]` to restore italics
  - % `\useunder{\uwave}{\bfseries}{\textbf}`
  - % use wavy underline in place of bold face

# Underline

Easy in MS Word!

- `\usepackage{ulem}`
- `\normalem`
- `\uline{something}` --> normal underlined text
- `\uuline{something}` --> double-underlined text
- `\uwave{something}` --> wavy underline
- `\sout{something}` --> delete text with line
- `\xout{something}` --> delete text with */////*.

# List (1/2)

- List: **label/marker**
  - Bullet: `\begin{itemize} \item ... \item \end{itemize}`
  - Sequential numbers: `\begin{enumerate} \item ... \item \end{enumerate}`
  - `\begin{description} \item[purpose]... \end{description}`
- **Changing label style:** `\item[+]`
- Support up to **four** levels
- Change label style systematically:
  - `\labelitemi`, `\labelitemii`, `\labelitemiii`, `\labelitemiv`
    - Example: `\renewcommand{\labelitemiii}{+}`
  - `\labelenumi`, `\labelenumii`, `\labelenumiii`, `\labelenumiv`
    - More complex: `counter`; `enumi`, `enumii`, `enumiii`, `enumiv`
      - `\arabic`, **`\Roman`**, `\roman`, `\alph`, `\Alph`
    - `\renewcommand{\labelenumii}{\arabic{enumii}}`

## List (2/2)

- `\usepackage{enumerate}`
- `\begin{enumerate}{{Phase} I}`  
`\item`  
`\end{enumerate}`
- A: `A a l i 1`
- Wonderful, right?
- General list is more complex; skipped here

# Customize Counters (1/2)

- Counters can be *{part, chapter, section, subsection, subsubsection, paragraph, subparagraph, page, equation, figure, table, footnote, mpfootnote, enumi, enumii, enumiii, enumiv}*
- Define new counters:  
`\newcounter{counter_name}[in_counter]`
- Change counter values
  - `\setcounter{counter}{num}`
  - `\addtocounter{counter}{num}`
  - `\stepcounter{counter}`
  - `\refstepcounter{counter}`



## Customize Counters (2/2)

- Printing counter values: `\arabic{counter}`,  
`\Roman{counter}`, `\roman{counter}`, `\alpha{counter}`,  
`\Alpha{counter}`, `\fnsymbol{counter}`

# Customize Lengths

- `\parskip`, `\textwidth`, ...
- `\setlength{\length_cmd}{length_spec}`
  - `length_spec` can be another command
- `\addtolength{\length_cmd}{length_spec}`
- `\settowidth{\length_cmd}{text}`
- `\settoheight{\length_cmd}{text}`
- `\settodepth{\length_cmd}{text}`
- `\stretch{decimal_num}`
- `\newlength{\new_len_cmd}`

# User-Defined Commands

- `\newcommand{\cmd_name}[narg][opt]{def}`
- `\renewcommand {\cmd_name}[narg][opt]{def}`
- Examples
  - `\newcommand{\xvec}{\ensuremath{x_1, \ldots, x_n}}`
  - `\newcommand{\avec}[1]{\ensuremath{\#1_1, \ldots, \#1_n}}`
  - `\newcommand{\anvec}[2]{\ensuremath{\#1_1, \ldots, \#1_{\#2}}}`
- `\providecommand{\cmd_name}[narg][opt]{def}`: if one exists, ignore the new one

# Conditional Text

- `\usepackage{ifthen}`
- `\ifthenelse{test}{then_text}{else_text}`
- `whiledo{test}{do_test}`
- Testing numbers: `<>=`
- Testing text: `\equal`
- Testing length: `\lengthtest{relation_in_<>=}`
- Testing switches: `\newboolean{string}`,  
`\setboolean{string}{value}`, `\boolean{string}`
- Combining logical statements: `\and`, `\or`, `\not`  
`\(, \)`

# User-Defined Environments

- `\newenvironment`{*env\_name*}[narg][opt]{begin\_def}{end\_def}
- `\renewenvironment`{*env\_name*}[narg][opt]{begin\_def}{end\_def}
- Examples:
  - `\newenvironment{sitquote}{\begin{quote}\small \itshape}{\end{quote}}`

# Theorem & Literal

- Theorem-like declarations: definition, corollary, declaration, lemma, theorem, axiom
  - `\newtheorem{struct_type}{struct_title}{in_counter}`
  - `\begin{struct_type}[extra_title] text \end{struct_type}`
  - *in\_counter* could be “chapter”, etc
- Examples
  - `\newtheorem{section-theorem}{Theorem}{section}`
  - `\newtheorem{chapter-theorem}{Theorem}{chapter}`
- `\begin{struct_type}[extra_title] ... \end{struct_type}`
- `\begin{verbatim} text \end{verbatim}`
  - Tab is treated as a single space?
  - In a single line: `\verb=<>=`
- `\begin{verbatim*} text \end{verbatim}`: blanks are printed as \_

## Literal Package (1/2)

- `\usepackage{alltt}`
  - You can put commands inside verbatim text: `\underline{typewriter}`
- `\usepackage{verbatim}`
  - `\begin{comment} ... \end{comment}`
  - `\verbatiminput[tab-spacing]{file-name}`: save memory compared to the original `\begin{verbatim}`

## Literal Package (2/2)

- `\usepackage{verbatimfiles}`
- `\verbatimfile{your-file}`
- `\verbatimlisting[n]{<filename>}`
  - With line numbers in each line
- `tabverb.sty`



Trick: how to include Java/C code?

Advanced!

## Package Listings

- `\usepackage{fancyvrb,moreverb,listings}`
- `\lstset{language=C,basicstyle=\footnotesize,fancyvrb=true,tabsize=8,breaklines=true}`
- `\sspace \lstinputlisting{pcapprog.h} \dspace`
- `\lstset{frame=trBL,frameround=tttt}`
- `\lstset{language=Java,basicstyle=\footnotesize,fancyvrb=true,tabsize=4,breaklines=true,showspaces=false,backgroundcolor=\color{listin  
ggray},rulecolor=\color{blue}}`

Trick: how to include Java/C code?

Advanced!

## Putting Programming Code

- algorithmic.sty
- newalg.sty
- alg.sty
- pseudocode.sty
- listings.sty
  
- <http://www.cs.washington.edu/homes/zasha/latex.html>
- <http://www.cs.washington.edu/homes/zasha/latexexample/index.html>
  
- `\usepackage{fancyvrb}`  
`\usepackage{listings}`  
`\lstset{language=Java,basicstyle=\footnotesize,fancyvrb=true}`
  - `\begin{figure}[htbp]`  
`\centering`
    - `\begin{Verbatim}[frame=single,baselinestretch=1,fontsize=\footnotesize,numbers=left] public void newImage(Object source , ImageData image) {`  
`//.. snipped code`  
`}`  
`\end{Verbatim}`
  - `\end{figure}`

**Trick: how to include Java/C code?**

**Advanced!**

## Algorithm?

- <http://www.cs.dartmouth.edu/%7Eethc/clr/scode/>

Trick!

# URL

- Should be in typewriter format
- Never be hyphenated

- `\usepackage{url}`
- `\url{URL}`

- `\urldef{\myurl}\url{wangxx@jmu.edu}`

# Text in Boxes

- Why?
  - Text with differing line width
  - Text in a box
  - Two paragraphs side by side
- **Box**: a piece of text
  - LATEX cannot break it apart
- Three types
  - **LR boxes**: text in a single line
  - **Paragraph boxes**:
  - **Rule boxes**:

# LR Box

- LR box:
  - `\mbox{text}`, `\makebox[width][pos]{text}`
  - `\fbox{text}`: framed box, `\framebox[width][pos][text]`
  - pos: *l* (left), *r* (right), *s* (stretched to fill the box)
- Vertical shifting of LR boxes:  
`\raisebox{lift}[length][depth]{text}`
  - `\raisebox{1,5ex}[0pt]{\bfseries Security Level}`
- Multiple use of a same box:
  - `\newsavebox{\boxname}`
  - `\sbox{\boxname}{text}`
  - `\savebox{\boxname}[width][pos]{text}`
  - `\usebox{\boxname}`

# Paragraph Box

- **Parbox** (LATEX jargon, paragraph box)
  - `\parbox[pos]{width}{text}`
  - `\begin{minipage}[pos]{width} text`  
`\end{minipage}`
    - pos: align with current baseline; **b**: bottom edge; **t**: top line
  - `\fbox{ \begin{minipage} {13cm} ...`  
`\end{minipage}}`

# Rule Box & Package

- Rule box: `\rule[lift]{width}{height}`
- Many tricks can be played using this

- `\usepackage{fancybox}`
  - Length: `\fboxsep`
  - `\shadowbox{text}`
  - `\doublebox{text}`
  - `\ovalbox{text}`
  - `\Ovalbox{text}`



# Box

- `\fancypage{cmds1}{cmds2}`
- Example:
- `\fancypage{\setlength{\fboxsep}{5pt}\setlength{\shadowsize}{3pt}\shadowbox}}`
- `\thisfancypage{\setlength{\fboxsep}{5pt}\setlength{\shadowsize}{3pt}\shadowbox}}`
- In my example, you have to use both to make them work!

# Footnote and Marginal Note

- Footnote:
  - Standard: `\footnote{text}`
  - Non-standard:
    - Reset the counter: `\setcounter{footnote}{0}`
    - Change the footnote marker:  
`\renewcommand{\thefootnote}{\number_style{footnote}}`  
`number_style: \arabic, \roman, \Roman, \alph, \Alph, \fnsymbol`
    - Results: †‡||\*¶§
  - `\footnote[num]{text}`
- In **forbidden modes** (LR boxes, tables, and math mode):
  - `\footnotemark[num]`
  - `\footnotetext[num]{footnote_text}`
- **Marginal notes:** `\marginpar{note_text}`
  - `\def\mf#1{\marginpar{\footnotesize \raggedright #1}}`

**Trick!**

# Comment

- Comments:
  - % text
  - `\begin{comment} ... \end{comment}`

# Table (1/2)

Easy in MS Word!

- Table

- `\begin{array}[pos]{cols} rows \end{array}`:  
**math mode**

- `\begin{tabular}[pos]{cols} rows \end{tabular}`

- `\begin{tabular*}{width}[pos]{cols} rows \end{tabular*}`

- pos: *t*, *b*;

- Cols: *l*, *r*, *c*, ***p{width}***, ***@{text}***

- Rows:

- `\hline`

- `\cline{m-n}`

- `\multicolumn{num}{col}{text}`

- **`\vline`**

# Table (2/2)

Easy in MS Word!

- Tricks
  - Add extra space between head and rows: `\\[0.5ex]`
  - Double horizontal line: `\hline\hline`
  - Common entry of a table: `@{text}`
    - Each row will **not** have position for this column
  - Alignment: `r@{:}`
  - Raise box: `\raisebox{1,5ex}[0pt]{text}`
  - Stretch the head: `\rule[-3mm]{0mm}{8mm} head-text`
    - `\newcommand{\rb}[1]{\raisebox{1.5ex}[0pt]{#1}}`
  - Long texts? `p{width}`
    - Use `\tabularnewline`, not `\\`
  - `\vline` makes **irregular** vertical lines between items
  - Redefine `\tabcolsep`: `\setlength{\tabcolsep}{5mm}`

# Table Packages (1/3)

Easy in MS Word!

- `\usepackage{array}`
  - Define `tabular` and `array`
- Format:
  - `m{wth}`: align vertically in the middle
    - `p{wth}`: align top
  - `b{wth}`: align along the bottom
  - `>{decl}`: `>\bfseries`
  - `<{decl}`: `>{$}c{$}<`
  - `\newcolumntype{C}{>{$}c{$}<`
  - `\extrarowheight`: `\setlength{\extrarowheight}{0.5ex}`
  - `\firstline`
  - `\lastline`

# Table Packages (2/3)

Easy in MS Word!

- `\usepackage{dcolumn}`
  - Define `array`
  - Define column specifier `D`
- `\usepackage{tabularx}`
  - Load `array`
  - Define column specifier `X`: expandable column
- `\usepackage{delarray}`
  - Load `array`: enclose the array in brackets
- `\usepackage{longtable}`
  - Multiple-page table

# Table Packages (3/3)

Easy in MS Word!

- `\usepackage{longtable}`
  - Multiple-page table
- Example: the first lines are FIXED

```
\begin{longtable}{||c|r}
\caption[Short title]{Demonstration of a long table} \\
\hline
Left & Center & Right \\
\hline \endfirsthead
\caption[ ]{\emph{continued}} \\
\hline
Left & Center & Right \\
\hline \endhead
\hline
\multicolumn{3}{r}{\emph{continued on next page}}
\endfoot
\hline \endlastfoot
Twenty-two & fifty & A hundred and eighty \\
22 & 50 & 180 \\
...
\end{longtable}
```
- `\newpage` to add a new page
- One has to LATEX **four** times to get everything right



## Floating Table (1/2)

- LATEX will automatically adjust the position of your tables; hence floating
- `\begin{table}[where] your-table \end{table}`
- `\begin{table*}[where] your-table \end{table*}`
  - where: **h** (here, allow but not force), **t**, **b**, **p** (specific page), **!**, **H** (absolutely here)
  - By default: **tbp**
- Figures are similar (see next slides)
  - `\begin{figure}[where] figure \end{figure}`
  - `\begin{figure*}[where] figure \end{figure*}`
    - Two-column format, across columns

## Floating Table (2/2)

- Force floating tables/figures out
  - `\clearpage`
    - Start a new page immediately after the place where the table/figure is defined
  - `\cleardoublepage`
    - For twoside format
  - But this will start a new page
- `\usepackage{afterpage}`
- `\afterpage{\clearpage}`
  - Output the figure/table after this **page**
- Force floats after their **position** in the text
- `\usepackage{flafter}`

# Floating Table Example

- **Floating table** example

```
\begin{table}[ht]
\begin{center}
\caption{Example configurations in terms of  $t^n$ . \label{example}}
\end{center}
\begin{tabular}{|c|c|c|c|c|}
\hline
& \multicolumn{2}{|c|}{\rule[-3mm]{0mm}{8mm} \bfseries RSA/MD5 SIG} &
& \multicolumn{2}{|c|}{\bfseries DSA SIG} & \\
\cline{2-5}
\raisebox{1,5ex}[0pt]{\bfseries Security Level} & 1-2 & 2-4 & 1-3 & 2-5 & \\
\hline
Intrusion tolerant against & & & & \\
outsider attacks (Y/N) & Y & Y & Y & Y & \\
\hline
Intrusion tolerant against & & & & \\
insider attacks (Y/N) & N & Y & N & Y & \\
\hline
\end{tabular}
\end{table}
```

# Floating Table

- It does **not** like **empty lines** in tabular!

# Force Floating Tables

- `\usepackage{float}`
  - H: here
  - Not enough space: start a new page
  - Ugly page break

# Table Caption and Labeling

- `\caption[short_title]{caption_text}`
  - short\_title for TOC
  - Numbering:
    - **Article**: from doc beginning to doc end
    - **Book/report**: within a chapter {3.4}
- Too long caption? Alignment?
  - `\parbox{width}{\caption{caption_text}}`
- Labeling?
  - `\caption[short_title]{\label{} caption_text}`

# Advanced Table Features

- `\usepackage{multirow}`
  - `\multirow{row_num}{width}{text}`
    - `\multirow{3}{*}{Here}`
  - Use `m{width}` as possible; if not satisfied, use `multirow`
- `\usepackage{colortbl}`
  - `\columncolor[color model]{color}[[left overhang][right overhang]`
    - `|>{\columncolor[gray]{.8}[0pt]}c|`
  - `\rowcolor[color model]{color}[[left overhang][right overhang]`
    - `\multicolumn{4}{>{\columncolor[rgb]{0.8,0.8,0.8}}c|}{text}`
    - `\multicolumn{1}{>{\columncolor[rgb]{0.8,0.8,0.8}}c|}{text}`
    - `\multirow{-3}{*}{Prerequisite}: if the column is colored!`
- Used with `\parbox` and `\begin{minipage}`

# Rotating a Table

- `\includepackage{rotating}`
- Use
  - `\begin{sidewaystable}`
  - `\end{sidewaystable}`
- To replace
  - `\begin{table}`
  - `\end{table}`



# Mix Tables/Figures and Text

- `\usepackage{floatflt}`

① `\begin{floatingfigure}[pos]{width}`

*Figure commands or*

*can be anything*

`\end{floatingfigure}`

- Pos: **r** (right), **l** (left), **p** (right for odd, left for even), **v** (like p unless an package option is given, in which case it is used)

② `\begin{floatingtable}[pos{`  
`\begin{tabular}{table specs}`  
`table entries`  
`\end{tabular}`  
`optional \caption command`  
`\end{floatingtable}`

# Generate EPS/PDFLATEX Files

- EPS

- PDF → PDF portrait → (pdftops -eps) PS file → (Gsview) EPS file
- ❶ PDF → Acrobat crop → Acrobat rotate to portrait → PDF save as EPS (or PS) → Gsview PS TO EPS: when you include set angle to 90; works beautifully
  - But fonts are missing!
- If you replace pdftops using Acrobat, you might lose colors

- PDFLATEX

- Project management file → PDF → PDF crop 6.0 → DONE
- PDF → Photoshop trim → DONE
- File is bigger, but all portrait (nicer)
  - PDF can be cropped with Acrobat 5.0 but they do not show well in PDF generated by pdflatex: how come?

# Another Way to Include Figure

- ```
\begin{figure}[ht]
\begin{center}
\fbbox{
\begin{minipage} {10cm}
%%%% \resizebox{!}{0.5\textheight}{
\scalebox{0.4}{
\includegraphics[angle=90]{InternetSecurity.eps}}
\end{minipage}
} \caption{Internet Security Protocols}
\label{TCPIPSecurityProtocols}
\end{center}
\end{figure}
```

# Graphics (1/4)

Easy in MS Word!

- Packages: **graphics**, **color**
  - `\usepackage[driver]{graphics}`
- Drivers: `dvips`, `pdftex`
- Driver-specific commands: **.def** file
- `\includegraphics`[`llx,lly`][`urx,ury`]{`file_name`}: do **not** use file extension
  - `\includegraphics*{filename}`: clipped version
  - `\includegraphicsx[]{filename}`
- Scaling:
  - `\scalebox{h_scale}[v_scale]{text}`
  - `\resizebox{h_length}{v_length}{text}`
- Reflection: `\reflectbox{text}`
- Rotation: `\rotatebox{angle}{text}`

## Graphics (2/4)

- Use **xfig**, **idraw** or other software to generate EPS file
- Use **gnuplot** to draw from data

- Figure

```
\begin{figure}  
  \begin{center}  
    \scalebox{0.4}{  
      \includegraphics{dnssec.eps}  
    }  
    \caption{DNSSEC and DNS dynamic update}  
    \label{dnssec}}  
  \end{center}  
\end{figure}
```

# Graphics: Epsfig

- `\usepackage{epsfig}`
- `\epsfysize=y_size` or `\epsfxsize=x_size`
- `\epsf[l|x l|y urx ury]{file_name}`
- Or
- `\epsfig{file=file_name,key=value,...}`

## Graphics (3/4)

- For uniformity, use the LaTeX2e graphics set, not the earlier **psfigure** set:

```
\usepackage{graphics}
```

...

```
\begin{figure}
```

```
\resizebox{!}{0.5\textheight}{
```

```
\includegraphics{foo.eps}}
```

```
\caption{Some figure} \label{fig:figure}
```

```
\end{figure}
```

## Graphics (4/4)

- `\rotatebox{90}{\includegraphics{myfile.eps}}`
- `\includegraphics[angle=90]{myfile.eps}`



## Figures Side-by-Side (1/2)

- `\begin{figure}`  
  `\centering`  
  `\begin{tabular}{cc}`  
    `\begin{minipage}{3in}`  
      `\includegraphics{a}\caption{a}`  
    `\end{minipage}`  
    `& second picture \\`  
  `\end{tabular}`  
  `\end{figure}`

## Figures Side-by-Side (2/2)

- ```
\begin{figure}
\begin{minipage}[t]{4.5cm}
\includegraphics[width=0.9\textwidth]{braun3c.eps}
\caption[Geometrical model for 0.65 ML Cs on Cu(112)]{0.65 ML
Cs} \label{fig:braun3c}
\end{minipage}
\hfill
\begin{minipage}[t]{4.5cm}
\includegraphics[width=0.9\textwidth]{braun4c.eps}
\caption[Geometrical model for 1.00 ML Cs on Cu(112)]{1.0 ML
Cs} \label{fig:braun4c}
\end{minipage}
\hfill
\begin{minipage}[t]{4.5cm}
\includegraphics[width=0.9\textwidth]{braun6c.eps}
\caption[Geometrical model for 1.80 ML Cs on Cu(112)]{1.8 ML
Cs} \label{fig:braun6c}
\end{minipage}
\hfill
\end{figure}
```

# Figure/Table Side-by-Side

- ```
\begin{figure}[htb]
\begin{minipage}[b]{0.5\textwidth}
\centering
\includegraphics[width=0.8\textwidth]{graphic.eps}
\caption{This is a Figure by a Table}
\label{fig:by:table}
\end{minipage}%
\begin{minipage}[b][0.5\textwidth]
\centering
\begin{tabular}{|c|c|}
\hline
Day & Data \\
\hline
Monday & 15 \\
\hline
\end{tabular}
\caption{This is a Table by a Figure}
\label{table:by:fig}
\end{minipage}
\end{figure}
```

# Sideway Figure

- `\usepackage{rotating}`  
`\begin{sidewaysfigure}[h]`  
`\begin{center}`  
`\caption{Feature and Topical Comparison}`  
`\label{bookcomparison}`  
`\scalebox{0.99}{`  
`%The first figure`  
`\includegraphics[angle=270]{SecurityBookSurvey.eps}`  
`}`  
`\end{center}`  
`\end{sidewaysfigure}`

## Flush a Floating Table/Figure

- `\usepackage{afterpage}`
- `\afterpage{\clearpage}`
- Use `\clearpage`

Advanced!

## Color (1/2)

Easy in MS Word!

- `\usepackage{color}`
- It accepts the same driver options as graphics
- It also accepts monochrome, dvipsnames, nodvipsnames, usenames
- Color **model**: rgb, cmyk, gray, named
- **Specs**: 0 — 1
- **Color**: red, green, blue, yellow, cyan, magenta, black, white

**Advanced!**

## Color (2/2)

**Easy in MS Word!**

- `\textcolor{color}{text}`
  - Color can be red, green, blue, yellow, cyan, magenta, black, white
- `\colorbox{color}{text}`
- `\pagecolor{color}`

# Mathematical Formulas (1/4)

- Math environment
  - **Text formulas or equations** (occurs within a line of text)
    - `\begin{math} formula\_text \end{math}`
    - `$ formula\_text $`
  - **Displayed formulas** (separated from the main text)
    - `\begin{displaymath} formula\_text \end{displaymath}`
    - `\[ ... \]`
    - `$$ ... $$`
  - Equations
    - `\begin{equation} formula\_text \end{equation}`  
automatically adds a sequential equation number
  - Multiple-line formulas
    - `\begin{eqnarray} formula\_text \end{eqnarray}`
    - `\begin{eqnarray*} formula\_text \end{eqnarray*}` // without equation number
- Math mode (use **braces**):  $x^{2n}_{2i}$ ,



# Mathematical Formulas (2/4)

- Fractions:  $\frac{\textit{numerator}}{\textit{denominator}}$
- Roots:  $\sqrt[n]{\textit{arg}}$
- Sums and integrals:  $\sum_{i=1}^n$ ,  $\int_a^b$ ,  $\int\limits_{x=0}^{x=1}$
- Continuation dots – ellipsis:  $\ldots$  (low dots),  $\vdots$  (vertical dots),  $\cdots$  (center dots),  $\ddots$  (diagonal dots)
- Math symbols:  $\alpha$ ,  $\beta$ ,  $\gamma$ ,  $\delta$ ,  $\epsilon$ ,  $\zeta$ ,  $\theta$ ,  $\lambda$ ,  $\mu$ ,  $\pi$ ,  $\sigma$ ,  $\tau$ ,  $\phi$ ,  $\chi$ ,  $\omega$ ,  $\Gamma$ ,  $\Delta$ ,  $\Theta$ ,  $\Lambda$ ,  $\Pi$ ,  $\Sigma$ ,  $\Phi$ ,  $\Omega$
- Calligraphic letters:  $\mathcal{A, B, C, \dots, Z}$
- Mathematical accent:  $\bar{a}$ ,  $\hat{a}$ ,  $\tilde{a}$

# Mathematical Formulas (3/4)

- **Binary operators:** `\pm`, `\mp`, `\times`, `\div`, `\cdot`, `\ast`, `\cap`, `\cup`, `\vee`, `\wedge`, `\oplus`, `\ominus`, `\otimes`
- **Relations:** `\le` (`\leq`), `\subset`, `\subseteq`, `\in`, `\ni`, `\ge` (`\geq`), `\supset`, `\supseteq`, `\neq`, `\approx`, `\cong`, `\equiv`, `\not\subset`, `\not\subseteq`, `\notin`, `\geq`, `\supset`, `\supseteq`, `\equiv`
- **Arrows and pointers:** `\leftarrow`, `\rightarrow`
- **Others:** `\forall`, `\exists`, `\clubsuit`, `\diamondsuit`, `\heartsuit`, `\spadesuit`, `\infty`
- **Functions:** `\sin`, `\cos`, `\gcd`, `\lim`, `\liminf`,
- `\stackrel{above part}{\downarrow} part`

# Mathematical Formulas (4/4)

- `\[ y = \left\{ \begin{array}{r@{\quad:\quad}l} -1 & x < 0 \\ 0 & x = 0 \\ +1 & x > 0 \end{array} \right. \]`  
`\right. \]`
- More complex examples: read the LATEX book

# Math Symbols

- `\usepackage{amsmath,amssymb}`
- `$$\mathbb{Z}$$`; Q, F, R

# LATEX Math Symbols

- `\usepackage{amsfonts}`
- $\mathcal{G}$ ,  $\mathcal{g}$ ,  $\mathcal{Q}$ ,  
 $\mathcal{q}$ ,  $\mathrm{G}$ ,
- $\mathit{G}$
- $\mathbb{Q}$ ,  $\mathbb{Z}$ ,  $\mathbb{R}$ ,  
 $\mathbb{G}$ ,  $\mathbb{\mathcal{G}}$ ,  
 $\mathbb{F}$ ,  $\mathbb{\mathcal{F}}$

# Symbols

- [http://www.artofproblemsolving.com/LaTeX/AoPS\\_L\\_GuideSym.php](http://www.artofproblemsolving.com/LaTeX/AoPS_L_GuideSym.php)
- [http://www.artofproblemsolving.com/LaTeX/AoPS\\_L\\_GuideCommands.php](http://www.artofproblemsolving.com/LaTeX/AoPS_L_GuideCommands.php)

**Advanced!**

- `\usepackage{amsmath}`
- `\xrightarrow{(t, n; g_q, q, p)}`
- `\xrightarrow[below-the-line]{(t, n; g_q, q, p)}`
- `\usepackage{amssymb}`
- `\usepackage{amsthm}`
- `\usepackage{extarrows.sty}`
- `\xlongleftarrow`

# Presentation Road Map

- LATEX: what, why, and how
- Document basics
- LATEX software

## • **Tex file structure**

① Preamble: margin & head/foot

② Body: TOC, text, table, figure, math formulas

– Bibliography

- LATEX for resumes: moderncv
- JMU thesis template
- LATEX for presentation slides



# Bibliography (1/3)

- A technical article usually has a bibliography section
  - You need to credit other people
- A bibliography can be in many **styles**
  - ❶ How are the entries ordered?
    - Alphabetically? The citing order?
  - ❷ How are the entries numbered/marked?
    - Natural numbers? Author abbreviation?
  - ❸ How do they appear in the text?
    - Numbers? Author-years?
- Many journals/conferences have different requirements: you have to be flexible!

# Bibliography (2/3)

- Some common bibliography styles
  - plain
    - Sorted alphabetically; running number, [running number] in text (in-text reference markers)
  - unsorted
    - Citing order; running number, [running number] in text
  - alpha
    - Sorted alphabetically; Author's name + year
  - abbrev
    - Same as plain
    - Abbreviate first names, months, and journal names
  - Author-year: parenthetical, textual: natbib
  - APA (American Psychological Association): apacite

# Bibliography (3/3)

- For the same bibliography item/entry
  - Under different styles, the order of the fields in the entry are different

# Bibliography Databases

- If you use the bibliography items **only once**, you can do whatever you like
- If you have to reuse the bibliography items many times (in different documents that you write)
  - You want to reuse them
  - These documents may require **different** bibliography styles (same bibliography items)
- **Bibliography database!**

# Bibliography: **Article**

- `\begin{thebibliography}{sample_label}`  
**entries**  
`\bibitem[label]{key} entry_text`  
...  
`\bibitem[label]{key} entry_text`  
`\end{thebibliography}`
- Notes: Entry\_text has much flexibility
- **Label:**
  - optional
  - By default it is a running number
- `\cite[extra]{key}: \cite[pages 74,75]{lampport}`
- `\cite{key_1,key_2}`
- `\nocite{key_i, key_j}`

# Bibliography (1/6)

- Some papers are referenced many times in different papers
- **Bibliography database**: a file with extension .bib
- Each item is identified by a unique key
- `\bibliography{database_a,database_b,...}`
- `\cite{a-key}`
- `\nocite{*}`: every entries in the database will be included.

# Bibliography (2/6)

- `\bibliographystyle{style}`: **marker style** and **ordering style**
  - **plain**: ordered alphabetically; running number
  - **unsrt**: ordered by their first references; running number
  - **alpha**: ordered alphabetically; abbreviation of author's name+year
  - **abbrv**: ordered alphabetically and running number; with shortened list
  - NON-standard bst file: author-year style
    - **apalike.bst**, `apalike.sty`
    - `newapa.sty`, `chicago.sty`, `astronomy.sty`, `harvard.sty`: not compatible with each other
    - `natbib.sty`
    - Parenthesis-style `\citep{}`, Text-style `\citet{}`

# Bibliography (3/6)

- Curly braces or double quotation marks
  - Book
  - Article
  - Booklet
  - conference
  - Inbook
  - Incollection
  - Inproceedings
  - Manual
  - Masterthesis
  - Misc
  - phdthesis
  - Proceedings
  - Techhreport
  - Unpublished



# Bibliography (4/6)

- Many papers appear in the same proceedings
- Cross-referencing
- `@InProceedings{xyz-1,`  
`crossref = {xyz-proceedings},`  
`...`  
`}`
- `@Proceedings{xyz-proceedings,`  
`Booktitle = ""`  
`...`  
`}`
- The **order** must be in this way

# Bibliography (5/6)

- Name:
  - Given-name last-name or **last-name, given-name**
  - Double surname: use {}
  - and in the name? Use {}
  - Too many authors: use John and Jack ***and others***
  - Junior or III?
    - {**surname, junior, given name**}
  - In one word, use **surname, Jr, given name**
    - Less trouble for conversion to EndNote
- Title:
  - TITLE and BOOKTITLE should be in capitalized form (the first letter)
  - Usually booktitle are capitalized while article titles are not

# Bibliography (6/6)

- **Abbreviations:**
  - @string{abbrev\_name = {text}}
  - @string(abbrev\_name = {text})
- The name of the abbreviations is **not** enclosed in *braces* or *double quotes*
- The abbreviation names are case-**in**sensitive
- Concatenations: if yrbk itself is an abbreviation, TITLE = “Max-Planck~” **#yrbk#**  
1993

# Author-Year Style

- Numbers may not be good for the subject of a sentence: [1] points out ...
- **natbib**: NEED to replace `c:\Local\TeX\textmf\bibtex\bst\base`
  - Plain.bst with plainnat.bst
  - Abbrev.bst with abbrevnat.bst
  - Unsrt.bst with unsrtnat.bst
    - TexLive 2007
      - C:\TeXLive2007\texmf-dist\bibtex\bst\base
- Works with **hyperref**;

## natbib (1/2)

- `\usepackage[options]{natbib}`
  - Options:
    - `round` (round parenthesis, **default**), `square` (square brackets), `curly` (curly braces), `angle` (angle brackets)
    - `colon` (multiple citations separated with semicolons, **default**), comma
    - `authoryear` (author-year, **default**), `numbers` (numerical), `super` (superscripted numerical citations)
    - `sectionbib` (use with `chapterbib`), `sort`, `sort&compress`, `longnamesfirst`,
  - `\usepackage[numbers]{natbib}`
- `\citet`: text
- `\citet*{key}`: all authors
- `\citep`: parenthesis
- `\citep*{key}`, all authors in parenthesis

## natbib (2/2)

- One can redefine the followings
  - `\bibsection`
  - `\bibpreamble`
  - `\bibfont`
  - `\citenumfont`: add `\itshape` or `\textit`
  - `\bibnumfmt`
  - `\bibhang`
  - `\bibsep`

- <http://web.reed.edu/cis/Help/LaTeX/bibtexstyles.html>

# apacite Installation

- American Psychological Association (APA)
- apacite.sty
- apacite.bst
- apacitex.bst
- Does **not** work with natbib
  - You have to disable “\usepackage{natbib}”
- Does **not** work with hyperref
  - You have to disable “\usepackage{hyperref}”



# apacite (1/3)

- `\usepackage{apacite}`
- `\bibliographystyle{apacite}`
- ... (Brown, 1998; Smith, 2000)
  - `\cite{}`
  - `\fullcite{}`
  - `\shortcite{}`
  - `\citep{}` in `natbib`
- Brown (2005)
  - `\citeA{}`
  - `\fullciteA{}`
  - `\shortciteA{}`
  - `\citet*{}` in `natbib`
- Sick of months such as (2005, July)?
  - `C:\Program Files\TeXLive\texmf\bibtex\bst\apacite>`
  - Remove
    - `month connect.with.comma.check`
    - `day connect.with.space.check`
  - From `apacite.bst` in the section of
    - ```
FUNCTION {format.year.month.day.check}
  {"year" year warning.if.empty
  "\BBOP}" "\BBCP}"
  year add.to.year.label *
  enclose.check
}
```

Cite at the **end**  
of a sentence

Cite at the **beginning**  
of a sentence

# apacite (2/3)

- `\usepackage{apacite}`
- `\bibliographystyle{apacite}`
- ... (Brown, 1998; Smith, 2000)

Cite at the **end**  
of a sentence

- `\cite{}`
- `\fullcite{}`
- `\shortcite{}`
- `\citep{}` in **natbib**

- Brown (2005)
  - `\citeA{}`
  - `\fullciteA{}`
  - `\shortciteA{}`
  - `\citet*{}` in **natbib**

Cite at the **beginning**  
of a sentence

- Brown
  - `\citeauthor{}`
  - `\fullciteauthor{}`
  - `\shortciteauthor{}`
- `\citeyear`
  - `\citeyearNP{}`: no parenthesis
- `\citeNP{}`
- `\fullciteNP{}`
- `\shortciteNP{}`

# apacite (3/3)

- Sick of months such as (2005, July)?
  - C:\Program Files\TeXLive\texmf\bibtex\bst\apacite>
  - Remove
    - month connect.with.comma.check
    - day connect.with.space.check
  - From apacite.bst in the section of
    - ```
FUNCTION {format.year.month.day.check}
{ "year" year warning.if.empty
"\BBOP{}" "\BBCP{}"
year add.to.year.label *
enclose.check
}
```

# apacite Errors

- ! Undefined control sequence.  
<argument> \@listctr  
l.3 \bibitem{AL01}
- Use
- `\bibliographystyle{apacite}`

# IGI

- [http://www.igi-global.com/development/author\\_info/index.asp](http://www.igi-global.com/development/author_info/index.asp)

## chapterbib

- In books/reports, each chapter needs a bibliography
- `\usepackage{chapterbib}`
  - Break into each file loaded with `\include` {this starts a new page, remember?}
    - No-new-page alternative:
      - `\cbinput{file}`
      - `\usepackage[draft]{chapterbib}`
      - `cbunit`
  - Each file should have
    - `\bibliographystyle`
    - `\bibliography`

# Bibunit

- One article may have several bibliography units
- Bibunits: bibliography for chapters
  - `\begin{bibunit}[alpha]`
  - `\cite{RFC2535}`
  - `\vspace{-0.55in}`
  - `\putbib[dnsssec]`
  - `\end{bibunit}`
  - It works with **natbib**
- Bibunit: `for %%f in (bu*.aux) do bibtex %%f {mybu.bat}`
- Use with bibunit (to remove the heading)
  - `\providecommand*\refname{}`
  - For **report/book**: `\renewcommand\bibname{}`
  - For **article**: `\renewcommand\refname{}`
    - `\renewcommand*\refname{REFERENCES}`

# Bibtex/Endnote

- <ftp://www.isiresearchsoft.com/pub/bibtex/>
- <http://www.cs.bham.ac.uk/~wbl/biblio/tools/>
  - <http://www.ecst.csuchico.edu/~jacobsd/bib/tools/index.html>
  - <http://www.ecst.csuchico.edu/~jacobsd/bib/index.html>
- <http://clwww.essex.ac.uk/search/software/code/bibtex2refer>
- <http://www.ctan.org/tex-archive/biblio/bibtex/>
- I have tried bp, bibtex2refer (awk script)
- Bibtex2refer.pl does **not** produce any output (am I doing something wrong?)



# JabRef

- GUI for Bibtex
- <http://jabref.sourceforge.net/>
- plugin: localcopy
- Apple: bibdesk

Trick!

# Document Management

- `\input{filename}`
  - Can be used in preamble and body
  - Put `\listfiles` in preamble
  - Can be nested
- `\include{filename}`
  - Can only be used in body
  - Always start with a new page
  - Combined `\includeonly{file_list}` in the preamble
    - Do not read .tex if files are not in the file list
    - But read .aux
  - Can **not** be nested
  - Just like Make file

## Cross-reference (1/2)

- `\label{marker}`
- `\pageref{marker}`
- `\ref{marker}`
- Refer to external documents
  - `\usepackage{xr}`
  - `\externaldocument[x-]{filename}`
  - `\ref{x-marker-in-the-external-file}`

## Cross-reference (2/2)

- Smart referencing
  - `\usepackage{varioref}`
  - `\bref{key}`
  - `\vpageref{key}`
  - A lot of more
- Equivalent to `\ref{key}` on page `\pageref{key}` but
  - The preceding page
  - The next page
  - The facing page
  - Page 24

# Index (1/2)

- `\begin{theindex}`  
Index\_entries
  - `\item`
  - `\subitem`
  - `\subsubitem`
  - `\indexspace``\end{theindex}`
- In your .tex:
  - `\index{index_entry}`
  - `\index{index_entry!sub_entry}`
  - `\index{index_entry!sub_entry!sub_sub_entry}`
  - `\index{lex_entry@print_entry}`
- Preamble: `\makeindex`
  - LATEX will generate your-filename.idx
- **Makeindex** program: .idx → .ind

## Index (2/2)

- Show indexes?
- `\usepackage{showidx}`
- Display all index entries as marginal notes
- Better set `\marginparwidth` in the preamble

# Glossary

- Special type of index (with their explanations)
- `\makeglossary` in preamble
- `\glossary{glossary_entry}`
  
- .glo
- Use the `description` environment to list them

# Presentation Road Map

- LATEX: what, why, and how
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  - ① Preamble: margin & head/foot
  - ② Body: TOC, text, table, figure, math formulas
    - Bibliography

## LATEX for resumes: moderncv

- JMU thesis template
- LATEX for presentation slides



# moderncv (1/2)

- ```
\documentclass[11pt,letterpaper]{modern
cv}
moderncvtheme[blue]{classic}
\usepackage[utf8]{inputenc}
%usepackage[numbers]{natbib}

\firstname{Xunhua Steve}
\familyname{Wang}
\title{Associate Professor, PhD}
\address{\mbox{Dept of Computer
Science} \ \mbox{James Madison
University} \ \mbox{701 Carrier Drive,
MSC 4103}}{\mbox{Harrisonburg, VA
22807 USA}}

\mobile{+1 434 568 0372}
\fax{+1 540 568 2745}
\phone{+1 540 568 3668}
\email{wangxx@cs.jmu.edu}
\extrainfo{\weblink{http://www.cs.jmu.edu/
wang.html}}
\photo[84pt]{dim2}
```

- With **bitunits**?
  - Use the latest moderncv.cls
- Long address label?  
See next slide

## moderncv (2/2)

- Long address?
  - <http://wiki.lyx.org/Examples/ModernCVClassIssues>
- moderncvthemeclassic.sty; line 122
  - `\begin{minipage}[b]{.225\textwidth}%`
  - Change it to this:
    - `\begin{minipage}[c]{.5\textwidth}%`

# CV

- <http://www.tex.ac.uk/cgi-bin/texfaq2html?label=cv>

# Presentation Road Map

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- **JMU thesis template**
- LATEX for presentation slides

- Will post my template soon

# JMU Thesis Style

- `\@makechapterheader` is defined for chapters
- `\@makeschapterheader` is defined for others such as list of tables, list of figures, dedications, ...
- **Move titles up?** Change 50 → -20
- Bibliography page numbering: hacker *thesis.bbl*; add `\thispagestyle{myheadings}` immediately before the first bib item
- URL? Use NOTE = `{\small \url{.....}}`
- Software: **texmaker**

# JMU Thesis

- <http://www.jmu.edu/cgop/current/thesisdissertation.shtml>
- <http://www.isi.edu/~johnh/SOFTWARE/uclathes.html>

# Presentation Road Map

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# Presentation Slides

- `\documentclass{slides}`  
preamble text  
`\begin{document}`  
slide text  
`\end{document}`

**MS PowerPoint is more flexible and powerful**

# Seminar/Presentation

- Prosper
- <http://prosper.sourceforge.net/screenshots-prosper.html>
- <http://amath.colorado.edu/documentation/LaTeX/prosper/styles/>

# Presentation Organization

- Advanced features
  - Myths about PDF
  - Hyperref
  - Latex tricks

**A few more tricks!**

# Wrap Around Long Strings

- `\newcommand*\wrapletters[1]{\wr@pletters#1\@nil}`
- `\def\wr@pletters#1#2\@nil{#1\allowbreak\if&#2&\else\wr@pletters#2\@nil\fi}`
- `\wrapletters{long-string-here}`

# Line Numbers?

- `\usepackage[pagewise]{lineno}`
- `\linenumbers*[1]`
- It does **not** work well with `listings.sty`
- For source code, turn off line numbers by `\nolinenumbers`
- Then you can turn back on
- `\makebox[\textwidth]{\hrulefill}` To refer to the code in the text body, use the inline verb format: `\verb!int m, n;!`