

Extending L^AT_EX with Packages

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Using Packages

- Extend L^AT_EX
- New commands, environments, behaviour
- Standard
`\usepackage{fullpage}`
- Options
`\usepackage[margin=0.5in]{geometry}`

Finding Packages

- Many packages are standard
- Newer packages are found on CTAN
<http://www.ctan.org/>
- Google Is Your Friend
<http://www.google.ca>

Installing Packages

- Get your system administrator to do it
- Install locally

```
$ export TEXINPUTS=~/.texmf/:  
% setenv TEXINPUTS ~/.texmf/:
```
- Install in the same directory

Refresher

```
% This is a comment.  
\documentclass{article}  
\begin{document}
```

```
\section{Refresher}
```

```
This is a document typeset in \LaTeX{}  
where \emph{I} will justify my raison  
d'\^{e}tre.
```

```
\end{document}
```

New Commands

- Save a command
`\let\textbforig\textbf`
- Create a new command
`\newcommand{red}[1]{\textcolor{red}{#1}}`
- Replace a command
`\renewcommand{red}[1]{\colorbox{red}{#1}}`
- Create a command if one doesn't exist
`\providecommand{blue}[1]{%
 \textcolor{blue}{#1}}`

New Environments

- Create a new environment

```
\newenvironment{figure}  
  {\begin{figureorig}[!htbp]}  
  {\end{figureorig}}
```

- Replace an existing environment

```
\renewenvironment{figure}[1][!htbp]  
  {\begin{figureorig}[#1]}  
  {\end{figureorig}}
```

- Environments are actually commands!

```
\figure and \endfigure
```

Lengths

- T_EX thinks about lengths separately
`\newlength{boxwidth}`
- Determining length
`\setlength{boxwidth}{5em}`
`\settowidth{boxwidth}{abc}`
`\settoheight{boxwidth}{abc}`
- Mathematics
`\addtolength{boxwidth}{-1ex}`

Using Lengths

- Use them anywhere lengths are required
`\rule{0.3ex}{\boxwidth}`
- Default lengths
`\rule{0.3ex}{0.7\textwidth}`
`\rule{0.3ex}{0.7\columnwidth}`
`\rule{0.8\textheight}{0.3ex}`

Boxes

- Basic building block for T_EX
- Single-line box (LR mode)
`\makebox[3cm]{Hello}`
`\mbox{Goodbye}`
- Framed box
`\framebox[3cm]{Hello}`
`\fbox{Goodbye}`
- Paragraph box
`\parbox{\columnwidth}{The\\TEXbook}`

Math Mode

- Some things must be in Math mode
`\beta` is β
- Doesn't work inside Math mode
`\[\beta = m/n \]`
- But this does
`\[\ensuremath{\beta} = m/n \]`
- For text too!
You must measure `\ensuremath{\beta}`.

ifthen Package

- Useful wrapper around conditionals
`\ifthenelse{test}{then}{else}`
- test can include
 - Boolean: `\AND` `\OR` `\NOT`
 - Infix numerical relations: `1<2` `2=2` `2>1`
 - String test: `\equal{Simon}{Simon}`
 - Length: `\lengthtest{1<2}`
 - Misc: `\isodd{1}` `\isundefined{\mycommand}`

Classes

- Used to determine document type
- Standard classes are:
 - article
 - book
 - letter
 - report
 - slides
- Global commands should be in packages

Packages

- Apply to most classes
- Loaded by `\usepackage{name}`
- Saved as `name.sty`

Headers

- Used to identify package

```
\NeedsTeXFormat{LaTeX2e}  
\ProvidesPackage{simon}%  
  [2004/03/23 Simon's Package]  
\RequirePackage{calc}  
\RequirePackage{ifthen} [1994/06/01]
```

@

- Commands are actually macros
- Global namespace
- Need reserved symbol: @
`\let\emph@rig\emph`
- In normal documents:
`\makeatletter`
It `\emph@rig{is}` mine!
`\makeatother`

Reporting Errors

- Three different error levels:

```
\PackageError{simon}
  {Can't frob the foo.}
  {foo is probably set incorrectly.}
\PackageWarning{simon}{Lookout for bar!}
\PackageInfo{simon}{I am happy.}
```

- Throw errors when things are wrong.

```
\newcommand{\address}[1]{%
  \renewcommand{\@address}{#1}}
\newcommand{\@address}{%
  \ClassError{uw-wkrpt}{%
    No \noexpand\address given}}}
```

Example

```
\NeedsTeXFormat{LaTeX2e}
\ProvidesPackage{homework}[2004/03/23 Simon's Homework]
\newcommand{\ud}{\ensuremath\,,\mathrm{d}}
\newcommand{\uD}{\ensuremath\mathrm{D}}
\newcommand{\deriv}[3][\ ]{%
  \ensuremath\frac{\!\ud^{\#1}\#2}{\!\ud^{\#3}\#1}}
\newcommand{\fr}[2]{\ensuremath{\mbox{\!}^{\#1}\!/_{\!}\!_{\#2}}}
\newcommand{\note}[1]{\rule{0pt}{2em}\textrm{\#1}}
\newcommand{\course}[1]{\newcommand{\@course}{\#1}}
\newcommand{\assignment}[1]{\newcommand{\@assignment}{\#1}}
\newcommand{\class}[1]{\newcommand{\@class}{\#1}}
\author{Simon Law}
\class{ComESutra}
\renewcommand{\maketitle}{%
  \noindent%
  \begin{tabular*}{\textwidth}{%
    l@{\extracolsep{\fill}}c@{\extracolsep{\fill}}r}%
    \textbf{\@course}
    & \textbf{Assignment \#\@assignment}
    & \textbf{\@date}\!%
    \@class & & \@author%
  \end{tabular*}%
}
```

Resources

- The Not So Short Introduction to L^AT_EX 2_ε
www.ctan.org/tex-archive/info/lshort/english/lshort.pdf
- L^AT_EX 2_ε for class and package writers
<http://www.ctan.org/tex-archive/macros/latex/doc/clsguide.pdf>
- UK List of TeX Frequently Asked Questions
<http://faq.tug.org>
- Source code:
`/usr/share/texmf/tex/latex/base/latex.ltx`
- Slides
<http://www.law.yi.org/~sflaw/talks/>