

# Debugging L<sup>A</sup>T<sub>E</sub>X Files

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## Illegitimi non carborundum

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## Working environment

- ▶ production shop; ~60,000 pages in 2016
- ▶ linux + emacs + versioning system (SVN)
- ▶ **texmf-main**: T<sub>E</sub>X Live 2016, frozen
- ▶ **texmf-local**: local versions of public packages
- ▶ **texmf-prd**: “internal” tree
- ▶ interactive command-line compilation
- ▶ latex → dvi  $\xrightarrow{\text{Adobe Distiller}}$  pdf (for print)
- ▶ pdflatex (for electronic output)

## Plan ahead

- ▶ Use a fully functional editor.
- ▶ Normalize file names: no spaces, all lowercase.
- ▶ Keep file size manageable.
- ▶ Books: Use a separate file for each chapter.
- ▶ Use `\include` and `\includeonly`.
- ▶ End each included file with `\endinput`.

## Features of a good editor

- ▶ flexible search facilities
- ▶ { brace } and \begin... \end matching
- ▶ multiple windows viewable at the same time
- ▶ “compare windows” facility
- ▶ “go to” specified line number
- ▶ ability to match strings and ask “how many?”

Don't update your  
system  
in the middle of  
an important project.

Always have a full  
backup.

Better yet:  
Make a copy of your files  
and experiment with  
that.

## Isolate and insulate your testing

- ▶ Set up a dedicated test area.
- ▶ Keep it separate from your “real” files.
- ▶ Copy files only as you need them.  
You *will* need the driver file that reads in all the others.
- ▶ Use a “soft link” to access other files in the job.
- ▶ Process the job interactively. Then you can
  - ▶ correct simple errors before they spawn meaningless messages (*do* make those corrections in *both* test and real files);
  - ▶ stop a job as soon as L<sup>A</sup>T<sub>E</sub>X encounters a problem that can't be fixed interactively.

## Tools for (interactive) diagnosis

Some commands send information to both the terminal and log file:

- ▶ `\show` and `\showthe` report current meaning or value, and suspend processing to permit additional interaction.

```
\show\LaTeX
  > \LaTeX=macro:
  ->\protect \LaTeX .
```

```
\show\protect
  > \protect=\relax.
```

```
\showthe\hfuzz
  > 1.0pt.
```

- ▶ `\message` can be placed in the file to signal progress.

```
\message{last section, page \number\thepage^^J}
last section, page 904
```



## More diagnostic tools — tracing

Tracing requests deliver more information than you usually want. The result is sent only to the log unless told otherwise.

- ▶ `\tracingoutput` reports the representation of all boxes that are written to the output;
- ▶ `\tracingcommands` and `\tracingmacros` give the gory details of L<sup>A</sup>T<sub>E</sub>X processing;
- ▶ `\tracingonline` directs the report of other tracing commands to the screen as well as the log.

Details of these commands can be found in *The T<sub>E</sub>Xbook* or in Victor Eijkhout's *T<sub>E</sub>X by Topic* (texdoc TeXbyTopic).

Under no circumstances  
make experimental changes  
in the only copy  
of your files.

## The log file is your friend

- ▶ Always check the log file for error messages.

```
! Undefined control sequence.
```

```
1.457 \fobx
```

```
      {%
```

- ▶ Warnings too.

```
LaTeX Warning: There were undefined references.
```

- ▶ If the system you are using hides the log file, ask how to find it.
- ▶ Don't delete the log file without looking at it.

## Find the line number where the problem occurred

(It's not always the line number reported in the log.)

First, find the file that contains the problem.

- ▶ Make a copy of the log file and start editing.
- ▶ Work backward from the error message.
- ▶ Remove irrelevant information, e.g. overfull box messages.
- ▶ Remove “completed” files (between parentheses):  

```
(C:/tech-support/debug/preface.tex  
Preface  
[1] [2]  
)
```
- ▶ Target: the file named after the last unclosed parenthesis.

There are two possible conditions:

- ▶ Problem is in the preamble or a package.  
Processing never reached `\begin{document}`;  
we'll cover that later.
- ▶ Problem is in the body of the document.
  - ▶ Typos or misspellings are easy to recognize.  
In commands, they can be fixed interactively.  
In environment names, halt the job and fix source  
before continuing.
  - ▶ Some problems are reported only at the end of the run.
  - ▶ For other problems, always make use of the log file.

## Problem reported at end of job

The report looks like this:

```
(\end occurred inside a group at level m)  
### semi simple group (level m) entered at line nnn (x)  
### bottom level
```

- ▶ Ignore any files with fewer than *nnn* lines.
- ▶ In large enough files, go to the specified line number and look for what was unmatched (reported by *x*).  
An unmatched `\bgroup` will be reported as `{`.

If *m* was greater than 1, and in a different file, fix the known problem, rerun and iterate.

## Problem reported in the body of the text

Clean out the files that will be tested.

- ▶ Modify the driver file (a copy!) to use `\includeonly`.
- ▶ Comment out unnecessary pieces not launched with `\include`:
  - ▶ irrelevant packages
  - ▶ `\tableofcontents`;
  - ▶ bibliography
  - ▶ `\printindex`
- ▶ Remove all comments:
  - ▶ lines with `%` at the beginning;
  - ▶ lines between `\begin{comment} ... \end{comment}` inclusive
  - ▶ lines between `\iffalse ... \fi` inclusive  
(this is equivalent to a comment).

## Look for mismatched groups: Use your editor's how-many function.

- ▶ number of opening braces { = number of closing braces }  
(sometimes the string "% }" is used to match; be aware)
- ▶ number of `\begin{` = number of `\end{`
- ▶ number of `\begingroup` = number of `\endgroup`
- ▶ number of `\bgroup` = number of `\egroup`
- ▶ number of `\[` = number of `\]`
- ▶ even number of `$` and even number of `$$`

Brace matching helps too.



## Divide and conquer

Goal: Isolate the smallest “chunk” that triggers the error.  
(Work with a copy. And keep another copy.)

- ▶ Find a good paragraph break halfway through the file.
- ▶ Do not separate a `\begin... \end` pair or any group.
- ▶ Insert `\endinput`.
- ▶ Process what's left.
- ▶ No error? Then the problem is in the last half.
- ▶ Remove the part that works.
- ▶ Keep splitting until the problem is found.
- ▶ Fix it and test. Test again in the full *test copy*.
- ▶ Success? Insert the fix in the *real* version and test again.

## Still looking . . .

Create a *minimum example*.

- ▶ Remove everything but the offending “chunk”.
- ▶ In what’s left, comment out lines that look harmless.
- ▶ Don’t delete anything yet—you might have to restore it.
- ▶ Keep testing until there is no way to remove anything more.
- ▶ Examine what’s left.

**Pay attention to the clues in the log.**

## Problem identified!

- ▶ Fix it in the test file and rerun L<sup>A</sup>T<sub>E</sub>X to confirm.
- ▶ Install the fix in your real file. Process it, and  
*if you find no other problems,*
- ▶ You're on your way!
- ▶ More problems? Back to start, but now  
you know how to proceed.

## Still puzzled?

- ▶ Now you have an “MWE” (minimum (non-)working example).
- ▶ Check the archives at  
`tex.stackexchange.com`  
for similar problems.
- ▶ Not found? Ask a new question.
- ▶ Clean commented material from your MWE and include it.
- ▶ Also include relevant lines from the log  
and an explanation of what you have tried.

Don't delete the log file  
until you have extracted  
every bit of useful  
information.

## The problem occurs before `\begin{document}`

- ▶ Make a copy of the log file, and find the open file.
- ▶ If this isn't a `\usepackage`, back up until you find one.
- ▶ Do you have experience of L<sup>A</sup>T<sub>E</sub>X internals?
- ▶ No. This is a good time to go to `tex.stackexchange`. If the problem hasn't been reported, post a question. Be specific, and include your preamble and log.
- ▶ Yes. Figure out what the problem is. Check reports at `tex.stackexchange`. If it hasn't been reported, notify the package author.

## Can't blame this one on L<sup>A</sup>T<sub>E</sub>X...

While compiling from the command line, the screen froze, and the job couldn't be halted by ^C. This is what was on the screen:

```
Overfull \hbox (23.1113pt too wide) in paragraph at lines 3288-3301
\OML/cmm/m/it/10.95 A$\T1/ptm/m/n/10.95 , as in
```

The story is actually more complicated, but we'll get back to that. This is what was in the log:

```
Overfull \hbox (23.1113pt too wide) in paragraph at lines 3288-3301
\OML/cmm/m/it/10.95 A$\T1/ptm/m/n/10.95 , as in  $\ddot{Y}[\ ]$ , is a degree-
```

Proceed ...

- ▶ Kill the stalled session from another window.
- ▶ `^C` prompt restored.
- ▶ Examine evidence to locate source where job stalled.
- ▶ Except that the source looked perfectly valid:  
... , as in `\S\ref{SS:changing}`, is a degree-1 ...

Many hours later, ...

- ▶ Processed in batch mode, the job finished successfully.
- ▶ No errors in that location, only the overfull box.
- ▶ Construct minimum example.
- ▶ Consult other colleagues ...



What is the problem?

- ▶ The user environment recognized only ASCII characters.
- ▶ The job specified `\usepackage[T1]{fontenc}`.
- ▶ `\S` (§) was converted to U+0178 (ÿ).
- ▶ When ÿ was output, the session was disabled.

**Moral:**

**Not every problem is a L<sup>A</sup>T<sub>E</sub>X problem!**

# Questions?

What's been left out?