Creating a LaTeX Minimal Example

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Abstract

Debugging LaTeX errors often requires creating a minimal (or minimum) example. This is particularly important when posting a bug report or request for help, as it facilitates the diagnostic process. Creating a minimal example will often help you identify the problem, without having the hassle of posting your query and waiting until you get a reply. This document illustrates how to create a minimal example. See also Need More Help?

The home page for this document is http://www.dickimaw-books.com/latex/minexample/. The source code for this document is available as a ZIP archive.

Contents

1 Introduction

A minimal example is the smallest possible complete document that illustrates a problem. A minimal example file should not include any packages or code that do not contribute to the problem, but must include a document class and the document environment.

There are two approaches to creating a minimal example: "building up" and "hacking down". This document illustrates both approaches. Creating the minimal example may lead you to the solution, but if you are still stuck, you can then post the minimal example. (Remembering first to search for the solution in the documentation and on the Internal, for example, in newsgroup archives or on forums or Q&A sites.)

Many package authors (including me) read messages on sites such as The LaTeX Community, TeX on StackExchange or on newsgroups such as comp.text.tex, so if you have a problem you can't solve it's generally a good idea to post your query in one of those places (remembering to paste the contents of your minimal file in your message). If you've made a mistake in your code, then someone may be able to point it out, which may mean that you get a reply quicker than you would if you posted your query directly to the author. Also, other people will be able to see your query and learn from it. Remember that no one is being paid or is otherwise obliged to answer your query, so be careful not to make your query sound like a demand or an accusation.

Note that when posting your query, you also need to give a brief description of the problem, and list the methods that you have tried to trace the problem. Don't go into a long rambling description of your project, as it generally doesn't help to identify the problem, and too much information can put people off reading your request. It's also a good idea to first search the comp.text.tex archives or use the search box on sites like The LaTeX Community, TeX on StackExchange to find out if anyone else has asked the same question. If you ask a frequently asked question, you may get a curt reply from people who are tired of answering the same old question, so check first.

2 Building Up

With the building up approach, you start with the document:

```
\documentclass{article}
\begin{document}
\end{document}
```

and add to it until you encounter your problem. If your problem requires the use of `\chapter`, then replace article with either report or book.

This section illustrates the building up approach with an example. Suppose your problem document looks something like:

```
\documentclass{myuniversityscustomclass}

\usepackage[french,USenglish]{babel}
\usepackage[mmddyyyy]{datetime}
```

```
\usepackage{nonstandardpackage}
\usepackage{anothernonstandardpackage}
% lots of other packages that may or may not be standard

% lots of your own definitions

\author{John Doe}
\title{Astounding Discoveries}

\begin{document}
\maketitle
\tableofcontents
\listoffigures
\listoftables

% 300 or so pages of text, graphics, tables, bibliography and
% sundry other stuff

\end{document}
```

Let's suppose that your problem is that the date on the title page looks like November 14, 2008, but you are expecting it to appear in the form 11/14/2008. You have already checked that you used the option `mmddyyyy` when you loaded the datetime package, so what's gone wrong?

Since you haven't used `\date`, the date on the title page is generated using `\today`, so the fault must lie in the definition of `\today`. It looks like it might be a bug in the datetime package, so what should you do? This happens to be one of my packages, but if you send me your entire 300 page document plus several hundred graphics files and a large bibliography file, I won't be best pleased. Aside from filling up my inbox, I don't have your university's custom class file, nor am I likely to have the non-standard packages installed on my system, so I won't be able to test the document. At which point you'll either get a request for a minimal example, or I'll think "forget that, I'll look at it some other day" (or words to that effect) and then several days, or possibly weeks, later you'll get a request for a minimal example.[1]

You've already worked out that the problem must lie with the command `\today`. So that needs to go in the minimal example. You want to use the datetime package to change the format of this command, so that package needs to go in the minimal example, with the package options you have specified in your original document:

```
\documentclass{article}
\usepackage[mmddyyyy]{datetime}
\begin{document}
\today
```

[1] Actually, these days I'll just ask you to post your bug report on my bug report form.

```
\end{document}
```

Call this file, say, `test.tex`, and run LaTeX on it. Have a look at the output. The output looks fine, so perhaps one of the other packages you have loaded has caused the problem. One by one try each of the packages you have in your problem document, in the same order. If adding the package has no effect on the output, then delete that package from the test file, and go on to the next one. For example, the problem document loads the babel package, so add that package to the test file using the same options that you used in your problem document. The minimal example should now look like:

```
\documentclass{article}
\usepackage[french,USenglish]{babel}
\usepackage[mmddyyyy]{datetime}
\begin{document}
\today
\end{document}
```

Now run it through LaTeX, and check the result. The output has changed to November 14, 2008, instead of 11/14/2008. This test file now reproduces the error, but is only six lines instead of several hundred or possible thousand lines.

What next? Check the datetime documentation to see if it mentions the babel package. The datetime documentation comes in both PDF and HTML format. Most PDF and HTML viewers have a function that allows you to search the document or page for a given word, so search for the word "babel". This should lead you to the sentence which states that the babel package must be loaded before the datetime package. Check the test file. In this test file, the babel package has been loaded first.

Now what? In this case, there is a FAQ for the datetime package (http://www.dickimaw-books.com/faqs/datetimefaq.html) so that's the next place to look. This FAQ covers the most commonly used packages that I have written.[2] If you look at the table of contents for the datetime section, you should see the entry "The date is in another language or in the wrong format". This fits the problem, so click on that link and have a look at the answer. The answer indicates that there was a bug in an earlier version of the datetime package that caused a problem when used in conjunction with the babel package, but the bug has been fixed. So the next thing to do is check which version you are using. Add the command `\listfiles` to the test file:

```
\listfiles
\documentclass{article}
\usepackage[french,USenglish]{babel}
\usepackage[mmddyyyy]{datetime}
\begin{document}
\today
\end{document}
```

[2] or more precisely, it covers the packages that I get the most post about.

At the end of the log file there should now be a list of all the files that have been loaded, along with their release dates and versions. Check the version of the datetime package. Is it the latest version? If not, download the latest version and try again. If it is the latest version, then send the author (me, in the case of the datetime package) the test file and its log file. If you check the package documentation, you should either find the author's contact details or a link to a bug reporting tool.

If the conflicting package is one that is not publicly available (for example, it's your university's custom package that can only be downloaded from a restricted site) then send your query to the author of that package. If the conflicting package is publicly available, but is not on CTAN, then specify from where it can be downloaded.

3 Hacking Down

The previous section illustrated how to build up a minimal example. This section shows how to hack down a minimal example. Again, we are going to start with a 300 page document which contains many images, tables and a bibliography.

```
\documentclass{myuniversityscustomclass}

\usepackage{nonstandardpackage}
\usepackage{anothernonstandardpackage}
% lots of other packages

\usepackage{glossaries}

% lots of your own command and environment definitions

\newglossaryentry{minex}{name={Minimal Example},
description={A small document illustrating failing behaviour},
text={minimal example}}

% lots more glossary definitions

\author{John Doe}
\title{Astounding Discoveries}

\begin{document}
\maketitle
\tableofcontents
\listoffigures
\listoftables

% 300 or so pages of text, graphics, tables and
% sundry other stuff
```

```
% Somewhere in the document is the following:
A \gls{minex is essential when encountering a \TeX\ or \LaTeX\
error you don't understand.

% Lots more text, figures, tables and a bibliography
\end{document}
```

This document is causing the following error:

```
Runaway argument?
{minexam is essential when encountering a \TeX \ or \LaTeX \^^Merror
\ETC.
! Paragraph ended before \\@gls was complete.
<to be read again>
                   \par
```

Suppose you don't understand what the error is or whereabouts in the document it is occurring[3].

Since you don't know what command is causing the problem, you can't use the approach illustrated in the previous section. So you will need to use the hacking down approach.

Before doing anything else, **make a copy** of the problem document. Call the copy, say, `test.tex`, and only edit this. Don't start messing around with the original document until you've solved the problem, otherwise you could lose your work!

One way of tracking down the problem is to use a binary search. Suppose your document contains 1000 lines of source code, then go to line 500 of your test document (i.e. half-way through it) and insert the line[4]:

```
\end{document}
```

(Make sure you don't put it inside a group or environment.)

Now pass the test document to LaTeX. You may get some warning messages as a result of omitting half the document, but don't worry about that for now.

- If the error still occurs, then the problem is in the first half of the document. In which case, delete everything after the first `\end{document}` (in your test file), and repeat the process.
- If the error goes away, then the problem is in the second half of the document. In which case, delete everything after `\begin{document}` up to, and including, the first `\end{document}` (in your test file), and repeat the process.

[3] Actually, in this example it should print the line number in the error message since `\gls` is a short command, but not all runaway argument errors give a helpful line number, so let's pretend it hasn't.

[4] LaTeX will finish the document when it reaches the first `\end{document}`, and ignore everything that comes after it.

Continue the process until you only have one paragraph left in your document. If this has an `\input` or `\include` command, first remove (or comment out) the command. If the problem goes away then the error is in that file, in which case replace the `\input` or `\include` command with the contents of the relevant file in your test file, and repeat the process. Once you have finished, it's a good idea to add `\listfiles`.

Let's suppose we now have a test file that looks like:

```
\listfiles
\documentclass{myuniversityscustomclass}

\usepackage{nonstandardpackage}
\usepackage{anothernonstandardpackage}
% lots of other packages

\usepackage{glossaries}

% lots of your own command and environment definitions

\newglossaryentry{minex}{name={Minimal Example},
description={A small document illustrating failing behaviour},
text={minimal example}}

% lots more glossary definitions

\begin{document}

A \gls{minex is essential when encountering a \TeX\ or \LaTeX\
error you don't understand.

\end{document}
```

It may be that you can now identify the problem, but let's suppose you still don't know what's wrong. The next thing to do is to remove unnecessary information in the preamble. If you have defined any commands or environments in the preamble that aren't used in the problem paragraph, then delete them. This includes any new theorems or glossary entries and so on. In this example, the problem paragraph contains a glossary entry, so keep the definition for that entry, and delete all the others:

```
\listfiles
\documentclass{myuniversityscustomclass}

\usepackage{nonstandardpackage}
\usepackage{anothernonstandardpackage}
% lots of other packages
```

```
\usepackage{glossaries}

\newglossaryentry{minex}{name={Minimal Example},
description={A small document illustrating failing behaviour},
text={minimal example}}

\begin{document}

A \gls{minex is essential when encountering a \TeX\ or \LaTeX\
error you don't understand.

\end{document}
```

Now, one by one, remove any packages that aren't contributing to the problem. Each time you remove a package, run the test file through LaTeX. If the error goes away, then put the package back in. If removing a package causes an "Undefined control sequence" error, then remove the undefined command as well. If the problem goes away, add the command and package back again. For example, if I remove the line:

```
\usepackage{glossaries}
```

then I will get an error as neither `\newglossaryentry` nor `\gls` will be defined. If I remove those commands, the original error message will go away. So I have to leave those commands in and keep the glossaries package in the test file.

Next, try substituting the class file for the article or report class file. If the error goes away, then the original class file is contributing to the problem, in which case put it back again. If this class file is not publicly available (for example, it may be an in-house class file, such as a university thesis, which has restricted access) then contact the author of the class file, and send the test file and log file. (Remembering, of course, to first search the documentation.)

If you followed all of the above steps, then the test file should now look like:

```
\listfiles
\documentclass{article}

\usepackage{glossaries}

\newglossaryentry{minex}{name={Minimal Example},
description={A small document illustrating failing behaviour},
text={minimal example}}

\begin{document}

A \gls{minex is essential when encountering a \TeX\ or \LaTeX\
error you don't understand.
```

```
\end{document}
```

In this example, you should now be able to work out that there is a missing closing brace to the argument of `\gls`. If, however, you still can't work out the problem, then (assuming that you've already read the documentation and searched relevant forums or newsgroup archives) copy and paste the test file in a message to somewhere like TEX on StackExchange or The LATEX Community or comp.text.tex.

4 Additional Files

You've tried building up or hacking down a minimal example, but the problem is caused by an additional file which you can't copy and paste into the minimal example file, so what do you do?

If the file is a graphics file, replace the command with a rule of the same dimension. For example, if your image is 4in wide by 3in high, then replace:

```
\includegraphics{myImage}
```

with

```
\rule{4in}{3in}
```

Alternatively, the mwe package comes with some sample images that you can use instead. For example, you could replace

```
\includegraphics{myImage}
```

with

```
\includegraphics[height=3in]{example-image}
```

(There are other test images provided by that package. See the mwe documentation for further details.)

If the file is a BibTEX file, then make a copy of the file, and remove the entries one by one until you are left with the entry that causes the problem. If the file is a CSV file, make a copy of the file, and remove the rows one by one until you are left with the problem row (but keep the header row if there is one.) You can then send this abridged file with the minimal example or you can embed it in the minimal example file using the filecontents or filecontents* environment[5]. This environment takes one argument which must be the name of the file. For example:

```
\documentclass{article}

\begin{filecontents*}{test.bib}
@article{sample,
```

[5]The starred form doesn't write extra comments in the file

```
 author={Ann Other},
 title={Sample Title},
 journal={Journal of Something},
 year=2014
}
\end{filecontents*}

\begin{document}
\cite{sample}

\bibliography{test}
\end{document}
```

5 Dummy Text

Sometimes a problem may only occur at a certain place or after a certain point, in which case you may need to create some dummy text to pad out your example. If so, the lipsum package is a useful tool. This provides the command `\lipsum` which has an optional argument that specifies the paragraph or the range of paragraphs to typeset.

For example, suppose you are using the book class and you don't understand why the page number appears on the bottom of the first page of the chapter and at the top of the second page. Then you could illustrate this as follows:

```
\documentclass{book}

\usepackage{lipsum}

\begin{document}
\chapter{Sample}

\lipsum[1-4]
\end{document}
```

This will produce enough text to generate two pages.

There is another dummy text package called blindtext that provides the commands `\blindtext` (for short blocks of text) and `\Blindtext` (for longer blocks of text). For example:

```
\documentclass{book}

\usepackage{blindtext}

\begin{document}
\chapter{Sample}
```

```
\Blindtext
\end{document}
```

The blindtext package also provides other commands to provide a random document, dummy lists etc. See the blindtext documentation for further details.

6 Where Do I Find Package Documentation?

These days most package documentation is provided as a PDF file and, if it is installed on your system, it can usually be obtained using the texdoc application. If you have a terminal or command prompt, you can access it by typing `texdoc` followed by the name of the package. For example, to obtain the documentation for the datetime package run:

```
texdoc datetime
```

Sometimes this may produce just the documented code rather than the user manual. For example:

```
texdoc flowfram
```

will display the documented code. However, in this instance, the first paragraph of that document tells you that the user manual is in `ffuserguide.pdf` in which case

```
texdoc ffuserguide
```

will produce the user manual.

In some cases (especially for older packages) the documentation may be contained in a `README` file in the documentation directory or it may be embedded as comments either at the start or the end of the `.sty` or `.cls` file.

Alternatively, if the documentation was not installed on your system, you can obtain it from CTAN. You can either use the search box on the CTAN home page or you can use the URL `http://ctan.org/pkg/`⟨*name*⟩ where ⟨*name*⟩ is the name of the package. For example, to obtain information on the glossaries package, you can use the URL `http://ctan.org/pkg/glossaries` and it will provide links to the documentation for that package.

7 Understanding Error Messages

TEX and LATEX error messages can be cryptic, but sometimes it's possible to at least find out where things have gone wrong by studying the message.

Consider the following document:

```
\documentclass{article}

\newcommand{\example}[1]{#1}
```

```
\begin{document}
This is a sample document that contains a long
command \example{with an error.

This is the next paragraph
\end{document}
```

This produces the following error message:

```
Runaway argument?
{with an error. \par This is the next paragraph \end {document}
! File ended while scanning use of \example.
<inserted text>
                \par
```

The first line ("Runaway argument?") indicates the type of error. A runaway argument is usually caused by a missing closing brace. The next line indicates where TEX got up to before things started to go wrong. In this error message there is no line number but you can use the information that has been supplied to help you track where the error might be. Copy the first part of this line (say `{with an error`) and paste it into your editor's search function. This should take you to the relevant line where you can see that there is no closing brace.

Suppose, instead, the document looked like:

```
\documentclass{article}

\newcommand*{\example}[1]{#1}

\begin{document}
This is a sample document that contains a short
command \example{with an error.

This is the next paragraph
\end{document}
```

In this case the error message is:

```
Runaway argument?
{with an error.
! Paragraph ended before \example was complete.
<to be read again>
                   \par
l.8
```

In this example, the error message includes the line number where things started to go wrong (l.8) so I can use my text editor's "go to line" function.

Sometimes the line number given in the error message doesn't correspond to the line number where the error actually occurs. For example, consider the following document:

```
\documentclass{report}

\author{A.N. Author}
\title{A sample document with a \badcommand}
\date{14th November, 2008}

\begin{document}
\maketitle
\end{document}
```

In this document the error is an undefined command (`\badcommand`) occurring on line 4. However, the error message is:

```
! Undefined control sequence.
\@title ->A sample document with a \badcommand

l.8 \maketitle
```

which indicates that the problem occurs on line 8. This is because TEX doesn't actually try to interpret `\badcommand` until line 8 when `\maketitle` tries to typeset the title page.

When this type of situation occurs, it may be necessary to do a little bit of detective work to try to trace the problem. In the above example, there are two methods to try:

1. The first line of the error message states the nature of the error (an undefined control sequence) and the second line indicates that the undefined control sequence is `\badcommand`. You can then use your text editor to search for any instances of `\badcommand` and replace it with the correct command. Alternatively, if you have forgotten to use a package that defines the command or, in the case of a custom command, you have forgotten to define the command, then do so.

2. The last line of the error message states that the problem was encountered on line 8 which contains the command `\maketitle`. What commands affect `\maketitle`? For the standard classes, such as report, these are: `\author`, `\title` and `\date`, so inspect the code where these commands are used. Try commenting out all but one of the commands and see if the error still occurs. For example, if I comment out the lines containing the title and date, the error goes away, but if I comment out the author and date instead, the error remains. This means that the error is in the title.

For further information on understanding error messages, see How to approach errors on the UK TeX FAQ. There is also a list of some common error messages in the document LaTeX for Complete Novices which is available from the same site as this document.

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Version 1.2, November 2002

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