The art of LaTeX problem solving

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Abstract

Have you ever been stuck using LaTeX? What does this really mean to you? "Stuck" may be anywhere from solving some esoteric error message while LaTeXing to trying to find a solution to a specific, not so obvious, formatting issue. There is a huge TeX community with a plethora of information where many problems have been solved by a highly knowledgeable group of volunteers. This article will attempt to lead you in the right direction to make the most out of the resources available during your LaTeX adventure. I will attempt to explain common errors and provide solutions with LaTeX and variations such as pdfLaTeX.

Introduction

Back in September 1992, I was invited to present a paper about supporting TeX and LaTeX at EuroTeX'92 in Prague, Czechoslovakia. At that time, I had only been working at the University of Delaware for five years. Now thirteen years later, I have been supporting the TeX and LaTeX community for a total of eighteen years. I use the term community, because I have helped many TeX and LaTeX users around the world, not just at the University of Delaware. In the article, *The Key to Successful Support: Knowing Your TeX and LaTeX Users,* I wrote

> ... Shortly after getting involved, I realized that this was not going to be a short-term project, but one that would last forever. What I mean by this is that from week to week, I would learn a new macro or style file, new previewer, new printer driver, new utility, new user and kept wondering how I was possibly going to stay above water and good support in such a changing environment.

These statements have proven to be so true. The foundation I laid eighteen years ago has paid off. TeX and LaTeX users at the University of Delaware have transitioned and transformed into (mostly) LaTeX 2_ε users over the years, as have I also, as the primary support person on campus. The training once offered several times every semester has dwindled to one customized class per year or as new technology emerges. The basic documentation provided over the years has been updated with samples and pointers to books and resources online. The two guidelines:

- don't reinvent the wheel, and
- email or call before getting too frustrated

have been my primary philosophy and strategy enabling users to connect with the best tools making it easier to master the art of LaTeX problem solving and truly appreciate LaTeX's beauty as a powerful tool. Of course, like all art, it is subject to interpretation, so each user will have a different level of tolerance and appreciation of their final product or artwork.

Oiling the squeaky wheel

For me, training and support relies heavily on others to solve common problems. I have built a support network within the University of Delaware community encouraging users to share their experiences and examples. It has been the only way I have remained sane all these years supporting TeX and LaTeX. In the article *LaTeX/TeX User: A Typist, or Typesetter?,* I mentioned several important points to remember when using macros created by others

1. Having the macros does not mean that the user does not have to pay attention to the original specifications or guidelines. It is important that the user check the document for correctness. Macros are developed with the intention of being correct, but errors do happen.
2. Users need to be reminded that the macros have been defined to meet certain specifications, and as a result the macros should not be changed. I hear complaints such as, "I don't like the way the document looks." The point is that it does not matter how they think it should look, and

altering the macros means the document no longer conforms to the specifications.

3. There needs to be good documentation on how to use the macros. References on which macros fulfill which specifications are important.
4. Examples should be provided whenever possible. Example documents of the input and output are easy ways of showing the organization of the document, how to use the macros, and what they will produce.

Resources

Interestingly enough, while technology for accessing network resources has changed over the years, such as your favorite flavor of search engines, most of our past resources are still available and relevant today in their new and improved forums such as the TeX user groups, CTAN, (LA)TeX newsgroups and FAQs. I must admit that `www.tug.org` and Google have become my best friends for connecting users with available network resources.

In addition, there have been many new books over the years and many have been updated to make them even more useful. Although more and more local versions of "Getting Started with LaTeX" or "How do I do *XXX* in LaTeX" are showing up all over the web, I believe the best working environment for users requires a set of TeX and/or LaTeX books on hand.

A collection or complete system of tools is a must when using LaTeX. It will make your LaTeX experience so much easier and more enjoyable. Many users find this very task overwhelming and confusing, because there are multiple choices just to get started. Some are free and some are not; what should you use? The answer to this question depends on your computer operating system and your comfort level with computers in general. Again, `www.tug.org` provides a wealth of information about both free implementations and commercial/shareware TeX systems, with links to the `www.ams.org` web page about commercial TeX-related sofware.

Common gotchas

Using a complex software package like (LA)TeX gets easier with experience and time. There is a steep learning curve, especially if you are interested in trying to solve errors or debug your LaTeX documents. If you always take an example or template and don't deviate from it, then you are good to go.

While this is a very important part of learning LaTeX, it won't necessarily help you if you need to make any changes. The art of LaTeX problem solving is understanding where to begin when you run into an error with LaTeX. Below are some common gotchas that might getcha during your LaTeX adventures.

- Preamble errors
- Missing or incorrect placement of `}`
- Blank lines or other spacing issues in math mode
- Forgetting about special characters, like $, %, & and quotation marks
- Protecting in moving arguments
- Misspelled environment or macro names
- Incorrect use of options or improper structure for an environment or macro
- Incorrect reference for numbering
- Mismatching braces, environments, "whatever"
- Changing size and style in text and math
- Figures and Tables
- Graphics

The largest numbers of complaints I receive are about the "meaningless error messages" in LaTeX. However, it is probably better to describe the error messages as meaningful to experts. Of course this doesn't help a beginner and to most this is by far what makes debugging LaTeX so difficult. However, the art of debugging LaTeX is the ability to divide and conquer around the error to see if you can produce a more meaningful error message or not get an error at all.

In my experience, most errors occur as a result of a missing or misplaced end environment or `}`. In addition, most users have a working document and then make changes which introduce an error. My suggestions are to always keep one revision behind or eliminate parts of the changes made and try to see if you can get back to a working document. Once you have a working document again, you can gradually add back changes so each small change will allow you to determine what may have caused the error in the first place.

Conclusion

Every user has a different learning style, but every user must be willing to learn LaTeX, if they plan to succeed and feel comfortable with it. Be on the lookout for updates for all your resources and keep up with the technology. Don't get intimidated and don't exceed your tolerance threshold of frustration before getting help. Doing so will allow you to transition and transform into a LaTeX problem solving art lover.

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