Writing with LaTeX
experiences of a student

Sebastian Pokutta

University Duisburg-Essen - Location Duisburg

pokutta@math.uni-duisburg.de

Lotharstr. 65, 47057 Duisburg

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Abstract

Almost all publications in mathematics and natural sciences are originally created using LaTeX. This format has many advantages, especially concerning the retrieval of information. Moreover, given a LaTeX-document, one can easily obtain the corresponding dvi-, ps- or pdf-file and it is possible to generate almost every custom format.

In contrast to its importance, however, the LaTeX-format has been widely neglected in many library-projects.

The question concerning us in this presentation is: What does a LaTeX-coded publication look like? We will focus our attention on LaTeX as format discussing a specific example, namely a PhD thesis.

Furthermore, the talk includes a short introduction to the treatment of LaTeX-sources and the role of LaTeX in the natural sciences.

The design of TeX and LaTeX as format

The basic concept

The main idea of TeX was to build a professional typesetting SYSTEMs, especially for mathematics and the natural sciences. In contrast to most other applications for "writing texts" TeX uses a decentralized concept instead of the common WYSIWYG principle. What is in first treated as disadvantage turns out to be very useful. Due to the separation of author and publisher it was possible for nearly everyone to generate texts of high quality appearance. This gave the author the possibility to control directly the layout of his work. This aspect shouldn't be under estimated, since the layout is the basis for information exchange and hence it has great influence on the way the reader picks up the information. Another great advantage of TeX designed as "markup"-language is that the source file is independent from improvements to your computer hardware. This made it possible to generate documents of high visual quality on out-of-the-shelf computers. Since the source code is of ASCII type and hence small, it is easy to exchange documents with others. The possibility of easy sharing documents improved the communication between the scientists. Moreover, TeX is extremely extensible using some kind of packages. The power of such an extension is nearly unlimited, since TeX is "turing-complete" which means that TeX satisfies all the demands of a programming language. Exactly this fact,

the power of a platform independent language, leads to concerns about using TeX as archiving language. There are TeX-based archive-server, for example the ArXiv server with more than 200.000 archived sources. It seems that TeX is capable to provide midrange archiving qualities.

What does a LaTeX work consists of?

A LaTeX work consists of various parts, such as the source file(s), temporary files, the output files, graphics and some meta information. Usually, there is one main file containing format attributes, macros, packages to include. Furthermore, this main file may already include the "text" itself. For larger documents it is more convenient to split the Text in several input files. This is especially useful for team work. Moreover, it can essentially reduce the time needed for "translating" the document into the output format. All the other files except the graphics, which can be more or less considered as input files, are generated by the "TeX compiler".

The Workflow

As mentioned above a LaTeX work usually consists of multiple input files. After typing the "text" using special "tags" the document is "translated" into the output format using a so called compiler. This compiler, the TeX compiler is the core of the (La-)TeX typesetting environment. Today, one usually extend the functionality of this core using macro/format packages. One of the most common packages used is the LaTeX package. This package provides special commands to ease the setting of texts with mathematical content. We will restrict our attention to the combination TeX / LaTeX.

How to obtain TeX and what does it cost?

TeX is non-proprietary software, although there are some "program packages" which are not free of charge. It is a collection of many programs, fonts, formats and macro packages i.e. LaTeX. Usually you obtain a TeX distribution, this means that someone did already collect the necessary files and bundled them in a comfortable way. Two of the most common distributions are teTeX and MikTeX. One should avoid to build up a complete TeX-SYSTEM without using some kind of distribution, since this is not easy at all. Furthermore it is recommand-

able to use a distribution which is published under a free license.

The LaTeX format / package

Historically, the first widely used version of the latex package was version 2.09 and released 1985. The latex format is a package to bundle the commands for actually setting the character into a more logical structure. It is a macro package. This package provides commands to ease the typesetting of large, complex documents, especially of documents containing mathematics. It enables the writer to embed tables, format equations, include graphics, colorize text, structure the document and so on. One could say, that latex adds a semantical layer to TeX to decrease the gap between the semantic of a text and the commands actually used to typeset this text. Learned societies of mathematics and the International Mathematical Union (IMU) regard TeX and especially La-TeX as 'a congenial and accessible way to give documents some structure without adding unreasonable burdens to the author'.

Writing with (La-)TeX - a pratical example

This presentation partly describes how a mathematical PhD thesis, which was submitted last year, were put into printed form using LaTeX and some additional packages. It is worth mentioning that, although the created document consists of 109 pages, all relevant files can be easily stored on one 3,5" floppy disc. For generating this PhD thesis several standard packages were used to "automatically" create specific parts such as the index, the table of contents and the bibliography (satisfying national standards). One of the possible presentation formats is a pdf-document. While generating a pdf-file one obtains a complete internal linking by just adding one line into the source code, namely, including the package "pdftex". When searching for some mathematical content in documents a full-text search is often very time consuming and not sharp enough. Here, the above mentioned almost automatically generated parts such as bibliography, index and table of contents, form a good basis for searching the mathematical content. It is particularly useful that these informations are available in separate files which are of ASCII type and hence can be easily used for retrieval purposes. Although the described features sound time intensive and complex in use, these features can be used in a convenient manner, actually, in most cases by just adding single lines.

In the presentation we will point out that LaTeX is very user-friendly by demonstrating the main workflow, that is, steps for generating a LaTeX document.