NOTE ON VERSION: The present article derives from my article in TUGboat **24**, 224 – 236, 2003, *through a few typo fixes and rewordings as well as through adding a few informations, in particular concerning recent developments. (If you want to refer to the* original *TUGboat version: this one is electronically available from* `http://www.tug.org/TUGboat/Articles/tb24-2/tb77lueck.pdf`.*)* — *For a very brief overview and some links, you might as well visit* `http://ednotes.sty.de.vu`

— *U. L.*

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ednotes — critical edition typesetting with LaTeX [updated version as of October 25, 2005]

Uwe Lück

1 Overview

1.1 Introduction

For typesetting critical text editions in the traditional manner, using TeX, there are currently three packages available from CTAN: EDMAC, LEDMAC and our ednotes. We list virtues and shortcomings of these three solutions and explain the features and usage of ednotes.

To be sure, there is a fourth package poemscol, available from the CTAN directory `macros/latex/contrib/poemscol`, written by John Burt, especially for critical editions of collections of poems (Burt, 2001).[1] We do not include this package in our comparison — we have not studied it.

We are reporting on version 3.17 of edmac.doc, version 0.6 of ledmac.dtx, and version 1.21 of our ednotes.sty. (We will also report on other files, without listing all their version specifications.)

1.2 Summary of comparisons

Essentially, only either EDMAC or LEDMAC on one side has to be compared with ednotes as the "opponent" on the other side. (We support this claim at the beginning of section 2.3 and undermine it at the same section's end.)

We list a number of tasks that a package for critical editions should accomplish. Some of these tasks are only accomplished by EDMAC and LEDMAC and not by ednotes. On the other hand, as to some solutions that all three packages accomplish the ednotes solution might be considered superior (with respect to the user interface). There even are a few little things which ednotes can do and EDMAC and LEDMAC (at present) cannot.

[1] The EDSTANZA extension of EDMAC and its LEDMAC port serve the same purpose.

1.3 Sketch of ednotes features

ednotes provides, firstly, a command `\Anote` such that the input

⟨*lcode*⟩`\Anote{`⟨*lemma*⟩`}{`⟨*note*⟩`}`⟨*rcode*⟩

yields the following output:

- in the main text (of the page or column at which TeX is currently working), printed output is the same as resulting from ⟨*lcode*⟩⟨*lemma*⟩⟨*rcode*⟩.
- ⟨*note*⟩ is printed in the uppermost of all footnote "layers" (of which there may be up to five) of the same page. ⟨*note*⟩ is there preceded with the number(s) of the main text line(s) in which ⟨*lemma*⟩ appears, with a repetition of (a variant of) ⟨*lemma*⟩, and with some separating stuff — see the input in figure 2 for the sample output in figure 1. At the user's choice, some of the line numbers mentioned appear in the margin of the main text.

1 There is nothing special to note in the first
2 line, neither in the second one.

1 first] upper **2** second] lower

Figure 1: Output of critical edition sample

```
\begin{linenumbers}
There is nothing special to note in
the \Anote{first}{upper} line, neither
in the \Anote{second}{lower} one.
\end{linenumbers}
```

Figure 2: Source for critical edition sample

By calling the package with extra options, you can create commands `\Bnote` etc. as well as new footnote layers, and you can choose their style (one common block on each page vs. single blocks — see (T4) below). ⟨*lemma*⟩ may have shapes like

⟨*start lem*⟩`\<`⟨*inner lem*⟩`\>`⟨*end lem*⟩

to indicate what short version of ⟨*lemma*⟩ is to precede the note. There are many facilities to customize appearance of notes. Commands

`\Anotelabel{`⟨*label*⟩`}`, ...

plus

`\donote{`⟨*label*⟩`}{`⟨*note*⟩`}`

vary `\Anote` so that lemmas may overlap. Further facilities allow use of the former commands even in some LaTeX tabular environments.

2 Task(s) and "rival" solutions

2.1 The task(s) of critical edition typesetting

Critical editions are needed in historical text-based work in the arts or sciences when the goal is finding a "definitive" version of a handwritten manuscript or of text that has been edited (in print or in copying by hand) several times. (For this and the following, cf. the exposition of the task in (Burt, 2001), whose author is obviously better informed on the subject than U. L.)

In a critical edition, the "true" text is printed as the main body of a page, and variant readings, remarks, and the like are printed at the bottom of the page. The traditional style of critical editions has the following features, which are thus also the tasks that the packages we discuss here have to handle.

To summarize the main feature in advance: variant readings, remarks and the like (let us call these things '*notes*') do not appear as standard footnotes, as, e.g., LaTeX provides them through `\footnote`. There are no footnote marks for indicating which note comments which passage of the main text. Rather (and here come the single partial tasks):

(T1) (**Marginal line numbers**) Consecutive numbers of the lines of the edited text are printed in the margin.

(T2) (**Keying**) To which passage of the main text a note refers is indicated by preceding the note with the line number and a (partial) repetition of that passage (which scholars call '*lemma*' and which often is just a single word).

(T3) (**Multiple notes series**) Typically, there are at least two separate kinds of notes — such as variant readings, text-critical notes, and testimonia — which use different layers at the bottom of each page.

(T4) (**Formatting notes compactly**) Notes of certain typical kinds are so short that much space would be wasted if each note was printed on its own line(s) (as would happen with a LaTeX `\footnote`). Rather, all the notes of a page belonging to one kind ("layer", "series") are arranged in (a) a single paragraph (**block formatting**) or even in (b) one layer of two or three columns (**columnar formatting**).

The above tasks are "musts"; a package not accomplishing them would be of no practical utility for critical editions. There are other goals which some authors would like or even urgently need, but which other authors do not require. Such are:

(X1) (**Cross-references to lines**) Neither Plain TeX nor LaTeX provide a mechanism for cross-referring to the *line number(s)* of a certain passage. This might be needed especially for commentary paragraphs *between* edited texts (e.g., if they are letters for which background information is offered or from which conclusions are drawn). Indeed, such a mechanism could be used for accomplishing task (T2).

(X2) (**Line numbering switches**) Depending on how long edited texts are and whether you need main text commentary surrounding them, it must be possible to switch numbering of lines on and off, or to restart numbering. Moreover, authors should be able to choose whether line numbers appear on the left or on the right side of the main text. It might also be desirable to choose whether all line numbers or whether, e.g., only every fifth line number is printed in the margin.

(X3) Editing *plays* often requires treatment of "**sublines**" and their numbering. As well, additional features for editing *poetry* are valuable.

(X4) (**Columnar notes formatting**) We repeat the problem (b) of arranging notes in columns at the bottom of the page from task (T4), since when *block formatting* (T4) (a) notes is supported, there is no longer a *vital* need for (b).

(X5) While footnotes may be appropriate for some kinds of notes, **endnotes** might be more appropriate in other cases.

(X6) (**Lemma abbreviations**) When the lemma is rather long, it should be displayed partially only preceding the note at the bottom of the page.

(X7) (a) **Nested** or even (b) **overlapping lemmas** may sometimes be needed.

(X8) (**Count word occurrences**) The "referring" feature (T2) is ambiguous if the lemma word occurs more than once in the given line. Traditionally this problem has been handled with an index n in the repetition of the lemma word preceding the note when the note refers to the n^{th} occurrence of the word in the line. Doing this manually is quite tedious, and so TeX macros to automate this job are often asked for.

(X9) Publishers like "**crop marks**" on camera-ready copies.

(X10) (**Lemmas in bad places**) Some features seeming very natural to TeX-laymen turn out to somewhat "resist" implementation (essentially due to some weaknesses of the TeX program). One example is the case of (a) lemmas inside

math expressions — especially in (equation) displays; another is (b) lemmas in **tables**.

2.2 History (and availability) of "rivals": EDMAC, LEDMAC, ednotes

Starting in 1987, John Lavagnino and Dominik Wujastyk wrote TeX macros for critical editions, originally of plays. This work terminated in 1996 with version 3.17 of the EDMAC package. Many researchers have, for their professional publications, used these macros by now, even for Arab and Sanskrit editions. Its manual and documentation are available as a beautiful book (Lavagnino and Wujastyk, 1996) from TUG; it also tells more about the history and usage of EDMAC. An overview appeared in (Lavagnino and Wujastyk, 1990). An EDMAC software distribution is freely available from CTAN, in `macros/plain/contrib/edmac`. And finally, Dominik Wujastyk maintains a beautiful *home page* for EDMAC at

`http://www.ucl.ac.uk/~ucgadkw/edmac/`

from which also some of the packages mentioned here can be downloaded. This web page also reports on alternatives to EDMAC for critical edition typesetting.

So all seemed to be happy. However, ...

When John and Dominik started their EDMAC project, Leslie Lamport's LaTeX format for TeX already had been born and was spreading widely among TeX users. By contrast, EDMAC had been written for the Plain TeX format, as described in Donald Knuth's TeXbook (Knuth, 1996). EDMAC is essentially incompatible with LaTeX (cf. section 2.3 below). It seems that nowadays most TeX users work with the LaTeX format, while Plain TeX is only used by a few exotics for, say, the history of science or music. The historians were tied to Plain TeX because they could not live without EDMAC.

In late 2002, Christian Tapp hired U. L. for a research project at the Chair for History of Science at the University of Munich. Christian expressed his sorrow that he needed TeX macros for his critical editions in the project, while being very adverse to 'learning Plain TeX' beyond LaTeX just to be able to use EDMAC. Uwe expressed his joy in writing TeX macros. Christian knew from many of his colleagues at the chair that they found it a nuisance that there was nothing resembling EDMAC that, at the same time, was compatible with LaTeX. This was the birth of our ednotes, which is now available from CTAN in directory `macros/latex/contrib/ednotes`. Christian devised functions and contributed the basic idea of implementation, and U. L. typed the definitions of macros, struggling with (La)TeX internals. So it seemed that from many's lamenting and Uwe's joy with TeX macros much more happiness emerged than there had been before in the EDMAC era. However, ...

One item of bad news is that one of the most severe bugs was fixed only in January 2004; until then we did not really dare to claim that the package worked. (However, we could help some test users with the problems they had with ednotes.) And more testing may be needed to see whether this situation has essentially improved. (However, at least Christian indeed worked with ednotes, using some awkward tricks to circumvent the bugs, or, at times, just enduring the bugs.)

Another bad news is that there are still some things that EDMAC can do and ednotes cannot, see section 2.3. And there are still things which *no* known package does as intended, see section 2.4.

Even the start was quite bad: Uwe saw that doing something like EDMAC in LaTeX needed a lot of knowledge of TeX and LaTeX internals and a lot of work. We were near to giving up. At this point, Christian luckily found two packages each of which relieved almost half of our burden. Stephan Böttcher's lineno.sty does all the work concerning line numbering — tasks (T1), (X1), and (X2) from the above. Alexander Rozhenko's manyfoot does all the work concerning multiple series of footnotes, some of which may be block formatted — tasks (T3) and (T4) (a). We only needed to add a user interface that would pass the author's wishes to the two packages in a nice way. Indeed, we did not try to emulate EDMAC, but thought of an even somewhat smarter user interface than EDMAC's — concerning overlapping lemmas (X7) (b), for example.

Finally, an issue arose when Peter Wilson came forward in March 2003 with apologies for not having known about our project (which, by then, had been announced on the EDMAC home page) and for developing a(n almost entirely) faithful copy of EDMAC for use with LaTeX. He called it 'LEDMAC'; it has been freely available from CTAN, `macros/latex/contrib/ledmac`, since a few days later.

The latter problem consisted in Peter, Christian and Uwe being afraid that all their work on TeX macros for critical editions had been in vain. At this point (re-)appeared Dominik Wujastyk on the scene, bringing peace by encouraging all of us, saying that it would be good if users had a choice. Indeed, LEDMAC and ednotes have different user interfaces and are implemented through quite different mechanisms. — Since then, all have seemed to be relatively happy. (Don't forget the bugs we had for

such a long time.)

2.3 When to use which package

In this subsection we list virtues and shortcomings of the three solutions introduced above, hoping to give useful advice for readers pondering the question of which solution they should adopt. (Originally, Dominik Wujastyk suggested that it would be nice if such a comparison were offered in the documentation of both LEDMAC and ednotes.)

EDMAC incompatible with LaTeX? Throughout this paper the reader will find claims that EDMAC is not compatible with LaTeX. However, these claims are somewhat inspired by *The TeXbook*'s (Knuth, 1996, p. vii) didactic method of temporary lying. At this point we try to stay closer to the whole truth.

(1) The EDMAC bundle (i.e., the content of the CTAN folder `.../edmac`) actually provides a LaTeX package edmacfss.sty for loading EDMAC under LaTeX. However, the purpose of this is primarily to provide LaTeX 2$_\varepsilon$'s (Frank Mittelbach's and Rainer Schöpf's) New Font Selection Scheme (NFSS) for use with EDMAC. So you run LaTeX on some document file which contains the command

```
\usepackage{edmacfss}
```

and use EDMAC commands in the document body. A considerable portion of LaTeX beyond NFSS will then at the same time work — but another considerable portion will not. First of all, edmacfss.sty reinaugurates the Plain TeX meaning of `\end` — so none of LaTeX's "environments" are available. Another large portion is everything concerning floats (including `\marginpar`s) and page layout — since EDMAC overwrites LaTeX's `\output` routine.

(2) One might just load edmac.doc (or a docstripped version of it) to use EDMAC under LaTeX. This would at least preserve the LaTeX meaning of `\end` and thus LaTeX environments. But the other compatibility problems named in (1) above will remain.

To conclude: You may try using EDMAC with format LaTeX. You may luckily succeed, using only a certain portion of LaTeX. Drawing *exactly* the line between the portions of LaTeX compatible with EDMAC and the portions incompatible might be helpful, but we don't try here; and for the sake of simplicity we will go on to claim that EDMAC is incompatible with LaTeX. — A variation of this theme is the content of ed-nfss.txt which comes along with EDMAC (in CTAN folder `.../edmac` as well as on the EDMAC home page).

	(L)EDMAC	ednotes
experience	+(+)	(+)
(T1) – (T3) "*basics*"	+	+
(T4) "*short notes*"	+	(+)
(X1) *cross-refer to lines*	+	+
(X2) *number switches*	+	+
(X3) *sub-lines, poetry*	+(+)	−
(X4) *columnar notes*	+	−
(X5) *endnotes*	+	−
(X6) *lemma substitutes*	+	++
(X7) (a) *nested lemmas*	+	+
(X7) (b) *overlapping lemmas*	(+)	++
(X8) *count occurrences*	−	(+)
(X9) *crop marks*	(+)	(−)
(X10) (a) *math mode*	(+)	(+)
(X10) (b) *tables*	+	+(+)

Table 1: Performance of (L)EDMAC vs. ednotes

Plain TeX or LaTeX? We assume throughout (relying on Peter Wilson's information) that LEDMAC is (as intended) a faithful copy (port) of EDMAC into LaTeX. This means that, except for a few command names, the functionality and user interface of EDMAC and LEDMAC are the same. (We will report below that LEDMAC has become even more powerful than EDMAC, but this need not bother us for the next few paragraphs.) For convenience, we therefore stipulate a hypothetical, imaginary being called "(L)EDMAC" which is one of EDMAC or LEDMAC with no definite decision as to which of the two it is (cf. Schrödinger's cat).

In the following, we will just compare (L)EDMAC with ednotes. If the reader sees that she needs ednotes, not (L)EDMAC, she is bound to use LaTeX, not Plain TeX (ednotes really needs LaTeX, there is no didactical lie at this point). (If the question arises, 'LaTeX' will mean LaTeX 2$_\varepsilon$ rather than LaTeX 2.09. Our goal was compatibility with LaTeX 2$_\varepsilon$, while we have not investigated which of the macros would work with LaTeX 2.09. Indeed, however, the version of LEDMAC that we have scrutinized needs a very recent version of LaTeX 2$_\varepsilon$.) If she, by contrast, rather needs (L)EDMAC, it is her personal choice between EDMAC with Plain TeX and LEDMAC with LaTeX.

Comparing ednotes to (L)EDMAC. We first refer the reader to table 1 for an overview of comparing ednotes to (L)EDMAC. What the signs (and parentheses) mean will be clear ('+' for implemented, '−'

for not implemented, etc.), and we will soon express their meanings in ordinary words and in some detail below. Tags (T1) etc. and (X1) etc., of course, refer to the list of tasks in section 2.1. Concerning the final "score", the reader will immediately observe that there is only one minus for (L)EDMAC while there are several for ednotes, but she should not overlook that, according to the table, ednotes is superior to (L)EDMAC in some respects. This, we hope, compensates for some missing features.

Moreover, this comparison should be considered a "snapshot" only. To be sure, John Lavagnino and Dominik Wujastyk seem to have stopped their work on EDMAC many years ago. By contrast, Peter Wilson has increased LEDMAC's functionality still this year and might continue doing so. ednotes' authors can conceive of removing some minus signs from their column; however, their capacities and eagerness are limited — but perhaps someone else will do the jobs!? — Inspired by David Kastrup, we remind the reader here explicitly and unashamedly that writing/extending TeX macro packages may be a question of money.

Most of the details of ednotes will be explained in sections 3 and 4 of the article. Here we attempt to compare ednotes to (L)EDMAC *without* giving the exact specifications of corresponding ednotes and (L)EDMAC features. So we will promise that some features of ednotes are superior to their (L)EDMAC counterpart, while the promises are kept only later. However, we will partially anticipate the presentation of the ednotes features so that the reader can make up her mind already through seeing the comparison.

We now simply work ourselves through table 1.

Experience: As told above, at least EDMAC has been used for many years by scholars for many professional publications. Experience with EDMAC transfers to LEDMAC. — By contrast, ednotes is very young, and we know of very few users. Christian Tapp uses it, and we know of three other users, using ednotes for their doctoral dissertations or other professional work. Other people have received an ednotes distribution, but we do not know whether they actually use it. — In 2005, additional users have shown up, and some have reported to succeed even with Arab and Hebrew. Hundreds of pages with thousands of annotations could be supported by an update.

"Basics" (T1) – (T4); (X4): Line numbering, keying, multiple layers of footnotes, and compact formatting of notes are provided by both (L)EDMAC and ednotes. ednotes, however, offers block formatting of notes only, not columnar formatting. Moreover, there is a difference in the user interface for doing these things which we describe in section 3. It depends on the kind of work and on personal taste which of the interfaces is nicer.

Cross-referring to lines (X1), line numbering switches (X2): (L)EDMAC and ednotes offer the same features in these respects, only the command names differ.

(X3) – (X5): sub-lineation, columnar formatting notes, endnotes, and editing poetry are provided by (L)EDMAC, while not by ednotes. More precisely, poetry is covered by LEDMAC, while Wayne Sullivan's EDSTANZA enhances EDMAC for this purpose.

Lemma tricks (X6) and (X7): Both (L)EDMAC and ednotes support nested lemmas. Moreover, (L)EDMAC offers facilities to change (*i*) the lemma tag preceding the note as compared with the whole lemma in the edited text (`\lemma`) and (*ii*) the line numbers preceding the note (`\linenum`). These facilities could be used to handle overlapping lemmas (indicating boundary line numbers "*manually*", i.e., the user must *know* them "in advance", cf. section 2.3 of edmac.doc and section 3.7 below). ednotes treats abbreviating or replacing lemmas as well as overlapping lemmas with different user interfaces (to be described in sections 3.6f.) — less tricky and more perspicuous, we hope.

(X8) — Counting word occurrences in a line automatically is not enabled by (L)EDMAC at all, while ednotes provides a halfway solution, to be described in section 3.10, where TeX and the user "share" the job.

Crop marks (X9) are available in both alternatives. EDMAC provides them with its own macros. Under LaTeX, crop marks are available from, e.g., crop.sty (generated from crop.dtx and crop.ins), the latter available for download at CTAN path `macros/latex/contrib/crop` — search for similar packages on CTAN with the term '`crop`'. In this respect crop marks are available with LEDMAC and ednotes in the same way. (It is difficult to express this situation in the table entries for (X9) properly.)

Difficult positions (X10) — math mode, tables: ednotes offers devices for lemmas in LaTeX tables (like `tabular` and and `longtable`). Very recently, moreover, we found modifications that essentially overcome the math mode problem (see the `mathnotes` option described in the package for details). — EDMAC has been augmented by a package tabmac.tex, maintained by Herbert Breger and Nora Gädecke and available from CTAN path `macros/plain/contrib/edmac`. This package offers some

facilities for building tables and critical editing of them using EDMAC. tabmac offers some devices which do not even exist in LaTeX. It even can be used to edit displayed equations (or other math lines). — Peter Wilson has incorporated tabmac into his LEDMAC, with English command names instead of the German ones from tabmac.[2] — (L)EDMAC has offered two further devices ("line number substitutes", "lemma substitutes") which could be used to cope with math text.

Further differences concerning items not listed in table 1:

(L)EDMAC and ednotes differ in implementation, viz., use of auxiliary files. However, this seems not to have any practical effects nowadays. On very old machines, (L)EDMAC might be slower than ednotes, while ednotes might cause memory overflow with small TeX versions and many notes. — March 2005: It was worse. One user now exhausted, with an up-to-date MiKTeX installation, the memory for multiletter control strings by 11.000 notes (on 450 pages) — these needed 33.000 control strings with the former lazy implementation. ednotes v1.1 is more careful and refined, needing only one string per note. So you can now make about 33.000 notes.

Meanwhile, LEDMAC — having originally been a LaTeX port of EDMAC — has grown in functionality beyond EDMAC. We have already reported the tabmac functionality incorporated in LEDMAC. Among other features that LEDMAC adds to EDMAC's functionality are: (*i*) indexing by line as well as by page (this has been made available[3] with ednotes as well in December 2004); (*ii*) the functionality of Wayne Sullivan's EDSTANZA for editing a certain kind of verse; (*iii*) a minipage-like environment — even breaking across pages — so that notes appear immediately at its end (instead of at the bottom of the page), which is useful for collections of short edited pieces (letters, e.g.); (*iv*) "sidenotes" (however, since `\marginpar` works with ednotes, it would not be too difficult to add sidenotes as well); (*v*) "familiar" *numbered* footnotes (which exist under ednotes due to the underlying manyfoot package). (*vi*) Another package ledpar adds parallel typesetting, in place of the incompatible parallel.sty.

On the other hand, Alexander Rozhenko's manyfoot (which ednotes loads) supports different styles of footnote rules, depending on which layers of notes they separate from each other.

2.4 Tasks not accomplished by any package

This may be the right place to point out some shortcomings that all the packages have *in common*.

- If tables contain entries consisting of whole multi-line paragraphs of running text, tricks like the above-mentioned may help in some situations, but there is no user-friendly way to refer to single lines of such paragraphs. Usually table *rows* are numbered, not these "sub-lines". More precisely:

  (*i*) We are sure concerning ednotes. The usual way in LaTeX of producing such paragraph entries is using `p{`⟨*dimen*⟩`}` in the table preamble, which works like `\parbox`es as table entries. The entries in the corresponding column are then single boxes. From ednotes' view, such a box is just a part of a line, ednotes cannot "see" the "sub-lines". The lineno package which is loaded by ednotes (see next section) offers a trick for numbering these "internal" lines and another trick for referring to them, but this is not nice. More generally (perhaps there is some alternative to these `\parbox`es?) such a paragraph entry must first be typeset in a vertical box. In order for each line of this paragraph to be viewed as a part of a line that ednotes can recognize, it would be necessary for the lines of the paragraph to be unpacked from the vertical box and somehow rearranged. ((L)EDMAC and parallel.sty do something like this, but it does not help for ednotes.) There just are no macros for doing this.

  (*ii*) We do not know definitively for (L)EDMAC, and we could not obtain a definite answer from its experts. However, we are convinced that it does not fare better. The situation of first typesetting the entry in a vertical box etc. is essentially the same, and when we scan the commands that EDMAC, tabmac, and LEDMAC offer, we are unable to find one which could do the unpacking and rearranging. With EDMAC and tabmac, there is not even a macro resembling LaTeX's `\parbox`.

- The packages are not compatible with the parallel package, which would help for displaying translations (e.g.). — However, in December 2004 Peter Wilson has extended LEDMAC by a package ledpar for combining the parallel features with LEDMAC. It is available from the LEDMAC directory on CTAN.

[2] In the original *TUGboat* article, I wrongly contended at this place that there had not been any user instructions for this tabmac port. I seem to have overlooked section 'Tabular material' of ledmac.pdf. Sorry. — U. L.

[3] It is not yet available on CTAN, only through communication with us.

- None of the packages can handle footnotes in the text to be edited.

Solving these problems would require mechanisms that differ drastically from the present ones (cf. remarks in ledmac.dtx concerning parallel — "a very different implementation for the functionality of parallel seems to be necessary so that line numbering is possible"). Something similar holds for the ensuing problem:

- All the devices for *block formatting* notes in all the packages (all deriving from *The TeXbook*) share the following problem: TeX decides on page breaking considering the heights of the footnotes. All the former macros estimate the height of the final block from the horizontal lengths of notes. So, e.g., there may be four footnote blocks, and the macros tell TeX that each is 2.25 `\baselineskip`s high (because in a very wide box, the notes form a line of two and a quarter `\columnwidth`s). So TeX reserves 4 times 2.25 `\baselineskip`s of vertical space for all the notes on the page, i.e., 9 `\baselineskip`s. In reality, however, if a note block does not fit into two lines, it needs three of them. So actually the four note blocks need 12 `\baselineskip`s. This discrepancy of 9 vs. 12 `\baselineskip`s may let the notes hang too deeply on the page or even let them overlap with the main text.

  Therefore John Lavagnino (co-author of EDMAC) suggested (January 2003) a mechanism very different from these common ones to us — typeset the whole note block for measuring at each note insertion.

  David Kastrup suggested that this approach is hopeless and informs us that rather the bigfoot package on which he is presently working solves the problem (a report on David Kastrup's work on critical editions is (Kastrup, 2004)). bigfoot is, in the long run, intended to be a replacement for manyfoot, overcoming the latter's shortcomings; however, replacing manyfoot by bigfoot in ednotes does not work at present.

  Recently both LEDMAC (`\footfudgefiddle`) and manyfoot (`\ExtraParaSkip`, and thus ednotes) have been enhanced by interim remedies for this problem. (Let us remark again that a proper solution as indicated may depend on money!)

Finally, as remarked above:

- Task (X8), that of counting word occurrences, has no fully automated solution.

3 How to use ednotes

We now turn from comparisons between EDMAC, LEDMAC, and ednotes to a more detailed description of ednotes. The present section describes the *commands* that ednotes (or sometimes lineno) offers.

3.1 Line numbering

The edited text whose lines are to be numbered and to which notes are to refer must be preceded by `\linenumbers` or must be enclosed in

```
\begin{linenumbers}
...
\end{linenumbers}
```

(see figures 2 and 1 again for an example). These and other commands for task (X2) are provided by Stephan Böttcher's lineno.sty, to whose source documentation (lineno.tex/pdf) we hereby refer. The user manual (ulineno.tex) is not quite up-to-date, but the instructions in the comment lines of lineno.sty are easily understandable — see especially the list below `\endinput`.

There is a bunch of package options for lineno.sty. You can call them as options for ednotes.sty — while their effects are explained in the documentation of lineno.sty. E.g., if you want the `modulo` feature of lineno (for printing in the margin only the line numbers which are divisible by 5), include `modulo` in the ednotes package options, as in

```
\usepackage[modulo,...]{ednotes}
```

You may also find the

```
\linelabel and \lineref
```

commands from lineno useful to refer to lines of the edited text without using the procedure for notes that ednotes provides. Even

```
\pageref{⟨label⟩}
```

works with `\linelabel{`⟨*label*⟩`}`.

In recent versions, lineno provides a command

```
\firstlinenumber
```

by which you can determine which line gets the first visible number attached to it. E.g., if you want to number lines 1, 3, 5, etc., type

```
\modulolinenumbers[2]
\firstlinenumber{1}
```

Without the last command, line numbers 2, 4, 6, etc. would be printed.

3.2 Footnotes

ednotes provides (at your choice) up to five kinds ("layers") of notes. It is your choice which of the five are installed and which of the two available formats of footnotes they will have. ednotes.sty has package

options `Apara` (which is the default option), `Aplain`, `Bpara`, `Bplain`, ..., `Epara`, `Eplain`. Whenever you choose the '`para`' version, the corresponding "layer" will be *block formatted*. If you choose '`plain`' instead of '`para`', notes of that layer will be formatted just as it would happen ordinarily in LaTeX, every note starting an own line.

Moreover, if you choose the "*block formatting*" style for one of your footnote layers, you can additionally choose whether each block of notes should start with an indent or not. You don't have to do anything if you want the indent; to omit the indent, include `para*` as a package option:

```
\usepackage[para*,...]{ednotes}
```

ednotes passes package options and commands for inserting notes to the underlying manyfoot package. In general, you need not know anything about the commands that the latter package provides. However, Alexander Rozhenko has (kindly on Christian Tapp's request) extended his manyfoot with customizing features so you can specify the existence and style of rules between certain footnote layers — if you know how ednotes and manyfoot work together. A documentation file manyfoot.dtx (manyfoot.pdf, nccfoots.pdf) for manyfoot is available from CTAN.

Better, manyfoot version 1.9 offers a command `\SetFootnoteHook`, supported by ednotes' version 1.2 `\PrecedeLevelWith`, which can be used to specify the apparatus on a page visually; as well as to control the indent of a footnote paragraph — cf. (L)EDMAC's `footstart` commands.

3.3 Keying notes to lemmas — basics

We now turn to the basic features of ednotes.

Recall from section 1.3 that ednotes provides a command `\Anote` such that

`\Anote{`⟨*lemma*⟩`}{`⟨*note*⟩`}`

keys ⟨*note*⟩ to the occurence of ⟨*lemma*⟩ at the place of that `\Anote` in main text. The package options `Aplain`, `Bpara`, ..., `Eplain` mentioned in section 3.2 above make the analogous commands `\Bnote`, ..., `\Enote` available. E.g., options `Bpara` and `Bplain` make `\Bnote` available, and

`\Bnote{`⟨*lemma*⟩`}{`⟨*note*⟩`}`

will send ⟨*note*⟩ into the footnote layer below that of `\Anote`. Anything we say about `\Anote` holds for the analogous commands obtained by these package options.

We use this occasion to emphasize that — as so often — at least two, and usually three, TeX runs are required to get the line number references right.

3.4 Nesting lemmas

In, e.g.,

`\Anote{`⟨*lemma1*⟩`}{`⟨*note1*⟩`}`

⟨*lemma1*⟩ may *contain* a nested note at the same or different level, e.g.,

`\Bnote{`⟨*lemma2*⟩`}{`⟨*note2*⟩`}`

— cf. figures 3 and 4 (where `\Anote` is used instead of `\Bnote`). ((L)EDMAC works similarly. — Here and in future examples we omit `linenumbers` which must appear somewhere according to sections 1.3 and 3.1.)

The same lemma may be used for notes of different kinds, e.g., in

`\Anote{\Bnote{`⟨*lem*⟩`}{`⟨*nB*⟩`}}{`⟨*nA*⟩`}`

```
\Anote{See \Anote{the}{inner}
       sample}{outer}.
```

Figure 3: Code for nesting sample

1 See the sample.

1 See the sample] outer **1** the] inner

Figure 4: Output of nesting sample

3.5 Another comparison with (L)EDMAC

The previous example situations offer an occasion for one comparison — to which we alluded earlier — of the user interfaces of (L)EDMAC vs. ednotes. (We choose LEDMAC for examples, EDMAC would just use a slightly different syntax.)

(*i*) `\Anote{`⟨*lem*⟩`}{`⟨*note*⟩`}` of ednotes has the same effect as

`\edtext{`⟨*lem*⟩`}{\Afootnote{`⟨*note*⟩`}}`

has under LEDMAC.

(*ii*) `\Anote{\Bnote{`⟨*lem*⟩`}{`⟨*nB*⟩`}}{`⟨*nA*⟩`}` in ednotes has the same effect as

```
\edtext{⟨lem⟩}%
  {\Afootnote{⟨nA⟩}\Bfootnote{⟨nB⟩}}
```

has with LEDMAC.

What do these examples teach us?

- ednotes needs typing of one command name less than (L)EDMAC. However, this can be changed by some simple definitions under (L)EDMAC. With LEDMAC, e.g.:

  ```
  \newcommand*{\Anote}[2]{%
    \edtext{#1}{\Afootnote{#2}}}
  ```

  — so you get the ednotes syntax with (L)EDMAC.

- On the other hand, (L)EDMAC syntax looks better adapted than ednotes' when notes of more than one kind refer to the same lemma.

So the basic syntax may look like an important aspect *prima facie* when you choose between (L)EDMAC and ednotes — but it is *not*. Rather, it is a point in favour of (L)EDMAC. Cf. sections 'The apparatus' and 'Marking text for notes' of the (L)EDMAC documentation. The advantages of ednotes' user interface will be described later.

3.6 Short lemma substitute preceding note

In

`\Anote{`⟨*lemma*⟩`}{`⟨*note*⟩`}`

⟨*lemma*⟩ may appear as ⟨*l1*⟩`\<`⟨*l2*⟩`\>`⟨*l3*⟩ (or this sequence may end earlier: ⟨*l1*⟩`\<`⟨*l2*⟩, e.g.). The lemma tag preceding the note then has form ⟨*l1*⟩⟨*ell*⟩⟨*l3*⟩ where ⟨*ell*⟩ is some ellipsis mark, as explained below, while in the main text just ⟨*l1*⟩⟨*l2*⟩⟨*l3*⟩ appears. The result is that you don't type anything twice, as is the case with EDMAC's `\lemma`. Figures 5 and 6 exhibit an example.

```
This is
\Anote{a \<somewhat long\> lemma}
      {no problem}.
```

Figure 5: Code for ellipsis sample

1 This is a somewhat long lemma.

1 a . . . lemma] no problem

Figure 6: Output of ellipsis sample

What appears between ⟨*l1*⟩ and ⟨*l3*⟩ in the lemma tag is customizable for the whole document (cf. `\renewcommand` example below). There is a *local* customization possible as well. In that sequence

⟨*l1*⟩`\<`⟨*l2*⟩`\>`⟨*l3*⟩

the ⟨*l2*⟩ may appear as

`<`⟨*ellipsis*⟩`>`⟨*ll*⟩

The tag preceding the note will then be

⟨*l1*⟩⟨*ellipsis*⟩⟨*l3*⟩

while the main text will be

⟨*l1*⟩⟨*ll*⟩⟨*l3*⟩

You may even let ⟨*l1*⟩ be empty.

For the ellipsis, we propose a new symbol `\textsymmdots` which differs from `\dots` in having no space on the right hand side, so the dots can appear really symmetrically between ⟨*l1*⟩ and ⟨*l3*⟩. (For dealing thoroughly with ellipses, see the ellipsis package by Peter J. Heslin in the `macros/latex/contrib` directory of CTAN.) `\textsymmdots` is the default ellipsis, i.e., if in

⟨*l1*⟩`\<`⟨*l2*⟩`\>`⟨*l3*⟩

'`\<`' is not followed immediately by '`<`', it yields the same output as

⟨*l1*⟩`\<<\textsymmdots>`⟨*l2*⟩`\>`⟨*l3*⟩

does (look at figures 5 and 6 again).

Note, in figures 5 and 6, the blank space before '`\<`' and the one after '`\>`'. These blank spaces are needed for some space before and after the ellipsis dots yielded by `\textsymmdots`. These dots would look quite bad if they were not surrounded by any spaces. Smaller spaces would do, they should at least be `\thinspace` (— we feel). So you see that we have decided that the user should care for these spaces. However, the user can change this feature by, e.g.,

```
\renewcommand{\lemmaellipsis}{%
  \thinspace\textsymmdots\thinspace}
```

in the document preamble (after the `\usepackage` line for ednotes), so she can move the blank spaces into the code between '`\<`' and '`\>`'. Note as well that if ⟨*l1*⟩ and ⟨*l2*⟩ are separate words, you *must* type a blank space either before *or* after '`\<`', otherwise they would appear as if they were parts of a *single* word ⟨*l1*⟩⟨*l2*⟩[. . .] in main text. Something analogous holds for `\>`. If the lemma is a single long word ⟨*l1*⟩⟨*l2*⟩⟨*l3*⟩, of which only ⟨*l1*⟩ and ⟨*l3*⟩ are to precede the note, it should be typed something like this, without full spaces:

`\Anote{`⟨*l1*⟩`\<<\thinspace\textsymmdots`
`\thinspace>`⟨*l2*⟩`\>`⟨*l3*⟩`}{`⟨*note*⟩`}`

(It might be preferable to introduce an abbreviation with `\newcommand`.)

3.7 Overlapping lemmas

`\Anotelabel{`⟨*label*⟩`}`⟨*lemma*⟩`%`
`\donote{`⟨*label*⟩`}{`⟨*note*⟩`}`

works just like

`\Anote{`⟨*lemma*⟩`}{`⟨*note*⟩`}`

— however, by using suitable ⟨*label*⟩s, you can indicate which of overlapping lemmas begins and ends where; look at figures 7 and 8.

Note that the second command is only `\donote`, not `\Adonote`. Beware as well the blank spaces which line breaks may cause, unless you elide them with the comment mark '`%`'. Usually however, you will rarely be forced into such a situation. We are in such a situation here because the present column width enforces so many line breaks.

```
\Anotelabel{l1}Observe
\Anotelabel{l2}this%
\donote{l1}{Look at this}
sample\donote{l2}{the present sample}.
```

Figure 7: Code for overlap sample

1 Observe this sample.

1 Observe this] Look at this **1** this sample] the present sample

Figure 8: Output of overlap sample

In ⟨*lemma*⟩,

`\pause{`⟨*label*⟩`}` and `\resume{`⟨*label*⟩`}`

act analogously to `\<` and `\>` above for lemma substitutes, and

`\pause{`⟨*label*⟩`}<`⟨*ellipsis*⟩`>`

employs your own ⟨*ellipsis*⟩ for the ellipsis. ⟨*lemma*⟩ may contain `\Anote` and the other way round (in some way).

3.8 Further items

We do not deliver a complete user manual here. Let us just note that there are various possibilities to customize the appearence of the note and what precedes it. The easiest one is perhaps redefining `\Anote` into something like `\variant` etc. The complete instructions can be read in ednotes.sty.

3.9 Editing tables

For critical editing of tables, ednotes offers the options `edtable` and `longtable`. The first one defines an environment `edtable`; the second redefines `longtable` from David Carlisle's longtable.sty (belonging to the Standard LaTeX Tools Bundle).

Environment `edtable`:

`\begin{edtable}{`⟨*tabenv*⟩`}[`⟨*pos*⟩`]{`⟨*tmp*⟩`}`
...
`\end{edtable}`

works like

`\begin{`⟨*tabenv*⟩`}[`⟨*pos*⟩`]{`⟨*tmp*⟩`}`
...
`\end{`⟨*tabenv*⟩`}`

— where the first line is meant to be the standard starting line of some LaTeX tabular environment; i.e., ⟨*tabenv*⟩ may be `tabular` or the like, ⟨*pos*⟩ is the positioning argument, and ⟨*tmp*⟩ determines the form of each `tabular` line. The only difference is that you can use ednotes commands within an `edtable`. — March 2005: Yet `[`⟨*pos*⟩`]` is overridden by `edtable`.

Option `longtable`: With this ednotes package option, you can use ednotes commands within `longtable` environments — provided the latter are in `linenumber` or like environments. Outside such an environment, `longtable` environments work without any change.

3.10 Multiple occurrences of lemma word

Here we turn to task (X8).

Recall the problem from section 2.1: Sometimes the lemma word occurs more than once in its line. Imagine, e.g., you are editing a Latin text with a line in which the word 'et' occurs three times, and you want to key a note to its second occurrence. The traditional way to handle this situation is to supply the lemma tag preceding the note with an index '2'.

Now, it is rather tedious work to check after printing how often each lemma word occurs earlier in its line. It would be nice if this could be done automatically. However, this would be a very tedious labour for the *macro programmer*. (And perhaps some part of the job would better be done by a program other than TeX in the manner of, e.g., makeindex.)

Only this year we have offered a halfway solution for this job (this was tedious enough programming labour). 'Halfway' means that there remains a job for the author/user. This job is the following: if you are typing some

`\Anote{`⟨*word*⟩`}{`⟨*note*⟩`}`

look some words back for other occurrences of ⟨*word*⟩. Each occurrence which is near enough to your

`\Anote{`⟨*word*⟩`}{`⟨*note*⟩`}`

so that it *might* be printed in the same line should then be made an argument of the command

`\countword`

and so should the occurrence of ⟨*word*⟩ which is the first argument of `\Anote`. Like this:

`\countword{`⟨*word*⟩`}`...
`\Anote{\countword{`⟨*word*⟩`}}{`⟨*note*⟩`}`

The reader may feel cheated by this kind of "solution". However, think of a situation where `\Anote{et}` is preceded by four occurrences of 'et' nearby. `\countword` then saves you from counting how many of these occurrences occur indeed in the same line as the *lemma* 'et'. And this will be even more helpful when you change text width or insert some text before the lemma. Moreover, we think,

looking back for earlier occurrences is not too heavy a burden.

`\countword` is defined only when ednotes.sty has been loaded with the option `countoccurrences`.

4 Packages related to ednotes

4.1 Overview

So far we have mentioned the packages ednotes, manyfoot, lineno, and longtable. Their names appear in figure 9, among others. Indeed, all the "strings" in figure 9 refer to package files, with the extension '.sty' omitted. We now explain those packages which have not yet been introduced.

The arrangement, in figure 9, of the package names and of the boxes in which they reside alludes to how they relate with or even "build" on each other. I.e., if the box containing the name of one package ⟨*file1*⟩ partially "covers" ("rests" on) the box containing the name of another package ⟨*file2*⟩, this means something from the following:

- ⟨*file1*⟩ does not *work* when ⟨*file2*⟩ has not been loaded (earlier), or, at least, some *option* of ⟨*file1*⟩ needs ⟨*file2*⟩. ⟨*file1*⟩ may load ⟨*file2*⟩ automatically (in one case at least this does not happen to avoid an option clash).
- ⟨*file1*⟩ *extends* or at least *modifies* the functionality of ⟨*file2*⟩.

If neither of ⟨*file1*⟩ and ⟨*file2*⟩ "covers" the other, they can be used independently from each other. — We will explain these interrelations more precisely below. First, we introduce the packages (or expand on them). We start at the bottom of figure 9 and work our way upwards.

Unless indicated otherwise, the packages are available from the CTAN directory `macros/latex/contrib/ednotes`. However, that it is available from a certain folder may mean that it is there "in disguise" only, requiring you to run other commands to actually create the `.sty` file. (Well, in January 2005 there is no instance realizing such a possibility.[4])

4.2 Packages from other authors

The following packages have not been written by us (i.e., by U. L. or Christian Tapp; or at least "not originally").

perpage by David Kastrup is available from CTAN in `macros/latex/contrib/misc`. It switches to pagewise numbering of footnotes. This is of limited use for critical editions where footnotes usually are not numbered anyway. However, there may be commentary or introductory passages by the editor(s) between edited texts, and these may have ordinary numbered footnotes. So ednotes.sty accepts a `perpage` option and passes it to manyfoot.sty which in turn loads perpage.sty, with customizations.

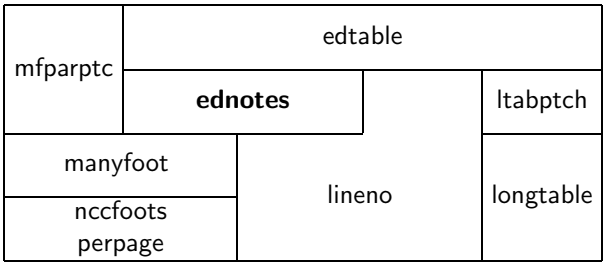

Figure 9: Packages related to ednotes

manyfoot and **nccfoots** by Alexander I. Rozhenko provide multiple "layers" of footnotes as ednotes needs them (section 3.2). They are available from CTAN in `macros/latex/contrib/ncctools`.

lineno by Stephan I. Böttcher (and recently extended and modified, for supporting ednotes better, by U. L., on his kind invitation) is available from CTAN in `macros/latex/contrib/lineno`; it provides numbering of lines and referring to line numbers as is needed by ednotes (section 3.1).

longtable by David Carlisle is part of the LaTeX distribution; it provides a multi-page tabular environment which lineno, or ednotes through lineno, modifies on request (`longtable` option) to enable themselves to work within (section 3.9).

4.3 Our packages not needing ednotes.sty

mfparptc: The mechanisms for typesetting footnotes as "*block formatted*" (one paragraph per page) known to us derive from Donald Knuth's suggestions in *The TeXbook* (Knuth, 1996, pp. 395 – 400). The (L)EDMAC documentation (section 'Paragraphed footnotes') and a *TUGboat* article by Michael Downes (Downes, 1990) describe shortcomings of *The TeXbook* macros, and EDMAC modifies these macros to remove those shortcomings.

Alexander Rozhenko's manyfoot does not consider these shortcomings and changes. Therefore, we wrote mfparptc to render the manyfoot block formatting mechanism working closer to EDMAC's.[5]

[4] In particular, Alex Rozhenko now offers "unpacked" manyfoot packages.

[5] We once hoped that Alexander Rozhenko would incorporate mfparptc into his manyfoot. The main reason not to do so is that mfparptc, at present, disables manyfoot's `\SplitNote`. (We hope eventually to have the time to fix

ednotes.sty loads mfparptc.sty when given the package option `edmacpara`.

ltabptch is available from CTAN at `macros/latex/contrib/ltabptch`. We are convinced that there are three spacing bugs in longtable, see LaTeX Bug Database, tools/3180 and tools/3485, and ltabptch fixes these bugs. (In essence, there is vertical space missing above a "long" table, and the interline glue below it is in general wrongly calculated.) We tried to convince David Carlisle to take these fixes into longtable; however, he convinced us that it is better to keep the bugs/features and offer a fixing package. This preserves document layout with source files written using the defective longtable. We have proposed a compromise — due to our original conviction, ednotes.sty loads ltabptch.sty given option `longtable`, whenever it is "visible" to LaTeX. An option `nolongtablepatch` enables the user to *avoid* this.

edtable was made as an enhancement of ednotes to cover LaTeX tabular environments (as explained in section 3.9). However, it does not really need ednotes.sty and may instead be used as a mere lineno extension. lineno.sty loads it given the option `edtable`, which indeed ednotes.sty passes. The package may eventualy vanish, the options or at least the functionality will stay.

4.4 Installation and standalone packages

This section is concerned with matters of installation and with what choices users have with regard to our packages. Installation will be interesting more for actual *users* than for *readers*.

- ednotes always requires lineno and manyfoot, and loads them automatically. manyfoot itself also requires nccfoots.
- ednotes requires longtable only when given the `longtable` option, loading it automatically in the latter case.
- ednotes requires perpage only when given the `perpage` option, loading it automatically then. (manyfoot also supports the `perpage` option.)
- The `edtable` option for ednotes enables the `edtable` environment described in section 3.9. (lineno also supports the `edtable` option.)
- ltabptch can be used as a standalone patch to the standard longtable package, to overcome the problems mentioned in section 4.3. It is loaded automatically by ednotes given the `longtable` option, unless you forbid this with the further option `nolongtablepatch`.
- mfparptc can be used as a standalone patch to the manyfoot package, but take heed of the limitations discussed in section 4.3. However, use the package option `edmacpara` to use it with ednotes, rather than loading it explicitly.

There are further interdependencies, but we hope this covers typical usage.

"Visible to (LA)TeX": Of course, nothing can be loaded unless it is "visible to (LA)TeX", that is, its files can be found by (LA)TeX. This notion is, for some users, somewhat difficult. So, a few hints:

- To be found, a package file must be in a folder which (LA)TeX searches when compiling (your main document file) `\jobname.tex`.
- You may put the file in the same folder as `\jobname.tex` itself. This is inconvenient if you want to use the package for several documents, in different folders.
- You may put the file in the `contrib` folder of the main `latex` folder.
- Or, you may put it in the same folder as another .sty file that you are already using. If you have used ednotes before, just put new package files into the same folder where ednotes.sty is.
- You may find further hints at

  `tug.ctan.org/installationadvice`

  and at

  `www.tex.ac.uk/cgi-bin/texfaq2html?label=wherefiles`

Package options: lineno.sty has a lot of package options; ednotes.sty accepts them all, and merely passes them on to lineno.sty (renaming one of them; we have described four of them). We have described 13 additional ednotes.sty options (two are passed to manyfoot.sty; and there are some "obsolete" ones).

This may stimulate worrying about how to *enter* all the options that one would like to use — they may not fit into one line. Fortunately, you can safely break code lines after the commas separating the option names in the `\usepackage` command:

`\usepackage[`⟨*option1*⟩`,`⟨*option2*⟩`,`
`...]{ednotes}`

5 Acknowledgments

We (U. L.) are indebted to Karl Berry, David Kastrup, Jerónimo Leal, Christian Tapp, and Peter R. Wilson for having read carefully earlier drafts of this article and for all their important hints, suggestions,

this.) There are further difficulties; e.g., `\linebreak` is modified in notes to eschew one. So the name mfparptc — meaning originally a "patch" — was somewhat arrogant, sorry.

judgments, and corrections. Thanks also to Karl Berry for (*i*) the invitation to write this article for *TUGboat* — among our profits is that our ednotes gets a printable description for the first time — and for (*ii*) his patience and generosity with regards to all our questions on setting up the article properly, and editing our English.

We are, maybe, most indebted to Alexander I. Rozhenko and Stephan I. Böttcher for changes to their packages manyfoot and lineno in time for this article. These changes simplified the structure of our former bundle very much and, thus, simplified this article. Indeed, Stephan Böttcher passed maintenance of his lineno to me so I could make the changes in favour of co-operation with ednotes on my own — special thanks!

The ednotes *package* profited very much from intense e-mail discussions with ("rival") package authors Dominik Wujastyk, John Lavagnino, Stephan I. Böttcher, Alexander I. Rozhenko, and Peter R. Wilson as well as from substantial "complaints" by our test users Robert Alessi, Florian Kragl, Sergei Mariev, Roy Flechner, Hillel Chayim Yisraeli, Saravanan M., and David Josef Dev. Thanks moreover to all the people mentioned for their encouragement of our work.

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