

The package imakeidx*

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Abstract

This package exploits the `\write18` facility of modern T_EX system distributions that allows to run system commands while typesetting a document written with the L^AT_EX mark up. By so doing, the index or indices, that are usually typeset at the very end of the document, are possibly split and sorted so as to include them in the document itself. This process has some minor limitations: it's impossible to start an index before all other pages have been ejected and to have the automatic run of the index sorting program.

1 Introduction

It's been some years now that the typesetting engine of the T_EX system is just *pdf_{te}x*; the original Knuthian *tex* is still corrected by D. E. Knuth himself, but is

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frozen, according to his will; it is still distributed by every T_EX distribution, but in practice only *pdf_{te}x*, *xet_{ex}* or *lua_{te}x* are used as the interpreter of every macro package and the true typesetter engine.

This program *pdf_{te}x* was originally born with the facility of producing either a pdf output file, as its name suggests, or a dvi file. Since then it has been enriched with many upgrades, also with regard to the evolution of the PDF language itself. It also incorporates the extensions of ϵ -T_EX and has the ability to open a shell so as to call system commands with their arguments. The same is true for *xet_{ex}* and *lua_{te}x*.

This facility, since the T_EX Live 2010 distribution, is official, but is sort of restricted, in the sense that the T_EX system configuration file contains a list of “safe” system commands that can be run by *pdf_{te}x*; presently the only program relevant for this package is *makeindex*. This precaution is necessary in order to avoid running malicious code. Other programs can be run, though, but it’s necessary to expressly tell *pdf_{te}x* that it can do so; this authorization is given by means of a suitable program option, as explained below.

This package will exploit this facility in order to run a perl script that is capable of splitting a raw index file into different chunks and to run the *makeindex* or *xindy* T_EX system programs so as to sort and format the index entries according to a specified index style file. Once the shell is terminated, the typesetting program resumes its work and possibly prints the various formatted indices produced in previous steps. In this way the document indices are always synchronous with their document and no further typesetting runs are necessary.

In order to reach this goal, it is necessary that at least the restricted `write18` facility is enabled; if the T_EX distribution in use does not enable this restricted feature by default, it is necessary to enable the typesetting engine to run such facility; depending on the distribution and the shell editor that is being used to work on a specific document, it is necessary to add `-shell-escape` (or `--enable-write18` for MiK_TE_X) to the command with which the typesetting program is launched, possibly through the shell editor. This applies to all three *pdf_{te}x*, *xet_{ex}*, and *lua_{te}x* typesetting engines.

If Lua_AT_EX is used and *lua_{te}x* is version 0.42 to 0.66, it’s impossible to distinguish whether the restricted shell escape is active or not, so the automatic procedure will be tried anyway, unless disabled with the `noautomatic` package option. With version 0.68 or later, the behavior is the same as with the other engines.

2 Package usage

This package is invoked as usual by means of a `\usepackage` command:

```
\usepackage[<options>]{imakeidx}
```

The available *<options>* consist in a comma separated list of the following options:

makeindex in order to use the *makeindex* sorting and formatting engine; this option is the default and is mutually exclusive with the next option.

`xindy` in order to use the *xindy* sorting and formatting engine; `texindy` is an alias for `xindy` and actually it's the script *texindy* which is called by this package. Nevertheless if the real *xindy* is desired, in order to avoid the settings made up by *texindy*, so as to add *xindy* the command line specific settings, it is possible to specify the option `truexindy`; the user is then responsible to set up the *xindy* engine with the suitable command line options.

`noautomatic` disables the automatic splitting of the raw index files and running of the system programs; this option might be used to save time when one knows for sure that the index files are already OK and do not need to be refreshed. Actually the time spent in splitting, sorting and formatting is so short that this option might be useful only when very lengthy indices are being processed.

`nonewpage` inhibits the new page command to be issued when using an article type document class and multiple indices are being typeset. We don't see why someone would use multiple indices in an article (except possibly for package documentations, which usually provide a macro index and a list of changes).

`quiet` suppresses all messages about manual index processing.

`original` uses the class-provided `theindex` environment for typesetting the indices; it is implicitly set if the document class option `twocolumn` has been specified.

`splitindex` calls the *splitindex* script by Markus Kohm, which is included in every T_EX Live distribution since 2009. With this option all index entries, which are written in one raw index file, are successively split into all the requested index files; in this way there is virtually no limit on the number of indices that is possible to create for a particular document.

The last described option deserves an explanation. L^AT_EX can write on a limited number of files during a run, and some of these *output streams* are already reserved (among these: aux files, toc files, lof files, lot files, plus several other ones). When more than one index is produced, there's the risk to run off the number of writable files, because normally `imakeidx` reserves an output stream for each index. So the `splitindex` option comes to rescue: with it only *one* raw index file is written. At the first `\printindex` command, the program *splitindex* is called; it splits the large index file into as many parts as the number of requested indices; after this, *makeindex* (or *xindy*) can do its job. In this way only one output stream is needed during the L^AT_EX run.

When should you apply this option, then? With one index it's useless, you should begin to consider it for two or more indices and definitely use it if you get the error

```
! No room for a new \write
```

Apart from this case, with or without it, the results are the same. See section 4 to see what files are written during the L^AT_EX run with or without the option.

3 Specific package commands

As it is customary when just one index is produced, the standard L^AT_EX facilities, i.e. the commands `\makeindex`, `\index`, and `\printindex` must be used. This package redefines them so as to produce multiple indices and defines some others. The first three of the following commands may be used only in the preamble.

`\makeindex` with the syntax:

```
\makeindex[⟨key-values⟩]
```

where *⟨key-values⟩* is a comma separated list of key-value assignments of the form: **key=value**; the available keys are the following:

name is the symbolic name for an index; if this key is not specified, it defaults to the value of the `\jobname` control sequence, in other words the name of the current main `.tex` file, i.e., the file that `\inputs` and/or `\includes` all the files of the complete document. This symbolic name is necessary only when doing multiple indices and is used with the `\index` command to point to the right index.

Example: **name=nameidx**

title is the title that is typeset at the beginning of the specific index; if not specified, the `\indexname` value is used.

Example: **title=Index of names.**

program is the name of the system program that is used to sort and format an index; valid choices are *makeindex*, *xindy*, or *texindy*, plus *truexindy*. If not specified the program specified among the package options is used. If no option is specified, *makeindex* is used. In order to use *xindy*, it's necessary to call *(pdf)latex* with the shell escape command line option. Example: **program=xindy**.

options is the list of options to be passed to the sorting and formatting program; this list is a balanced text of program options, separated with the syntax required by the sorting and formatting program. For example, in order to use a different *makeindex* sorting and formatting style *mystyle.ist* and avoiding any message in the screen output, write **options=-s mystyle**.

noautomatic is a boolean key that defaults to **false**; you can set it to **true** by simply listing its key in the key-value list, without necessarily specifying the **=true** part. If specified the index sorting program won't be called during the typesetting run for this particular index.

intoc is a boolean variable that defaults to **false**; if you want to set it **true** you must simply list this key in the key-value list, with no need of

specifying the `=true` part. By setting this key to `true` an entry for this particular index is put in the table of contents.

columns accepts an integer representing the number of columns in the index; this is silently ignored if the `original` or the `twocolumn` options are set; the number can even be 1.

Example: `columns=3`

columnsep accepts a dimension representing the separation between index columns; the default is 35 pt as in the standard classes.

Example: `columnsep=15pt`

columnseprule is boolean; if it is set, a rule will appear between the index columns.

`\indexsetup` with the syntax:

```
\indexsetup{<key-values>}
```

where again *<key-values>* is a comma separated list of `key=value` assignments; the available keys are:

level which takes as value a sectioning command such as `\chapter` or `\chapter*`. Actually any command with an argument will do and will receive the index title as its argument. The default is `\chapter*` or, if the class doesn't provide chapters, `\section*`. If you specify `\caption` so as to override the default `\chapter*`, the index title goes directly to the table of contents; in this case do not specify the `intoc` option.

toclevel which takes as value a sectioning command *name* such as `section` to indicate the level at which we want the indices appear in the table of contents.

noclearpage is a boolean option; when set, no `\clearpage` will be issued between indices. You might want to set it in order to have a 'chapter of indices'; in this case you are responsible for setting the right value of the above keys. For example

```
\indexsetup[level=\section*,toclevel=section,noclearpage}  
...  
\chapter*{Indices}  
\printindex  
\printindex[names]  
\printindex[objects]
```

See more on this subject in section 5

firstpagestyle which takes as value a page style, default `plain`. You might want to set it to `empty` or some other page style defined by the class or by yourselves. This keyword is disabled when the package `fancyhdr` is loaded; any definition or choice of page styles must be done before typesetting the indices.

headers which takes two values: the left and right marks. You might want to use this for disabling automatic uppercasing, by saying, for example, `headers={\indexname}{\indexname}`; notice that these values should always be a pair of balanced braced texts. Don't use these keys if you use `fancyhdr`.

othercode which takes as value arbitrary T_EX code that will be executed at the beginning of index entries typesetting. For example you might want to change here the setting of `\parskip`.

`\splitindexoptions` must have as its argument the command line option to *splitindex*; this might be necessary on some systems. The default is `-m ""`, because we want it only for splitting the large index file into its components which are later processed by this package.

`\index` with the syntax:

```
\index[⟨name⟩]{⟨entry⟩}
```

inserts *⟨entry⟩* into the raw index file(s); upon splitting it in different files, this particular entry is listed in the specific index file with name *⟨name⟩*; if no name is specified, this *⟨entry⟩* is added to the default index with name `\jobname`. The *⟨entry⟩* should be written according to the particular syntax of the sorting and formatting program.

`\indexprologue` with the syntax:

```
\indexprologue[⟨spacing⟩]{⟨text⟩}
```

is used to define some text to go between the index header and the entries; the *⟨spacing⟩* should be a vertical space command such as `\vspace{36pt}` (default is `\bigskip`), controlling the spacing between the prologue and the index proper. The command affects only the next index produced by `\printindex` and is best placed just before this command.

`\printindex` with the syntax:

```
\printindex[⟨name⟩]
```

is used to typeset the particular index named *⟨name⟩*; if no optional argument is specified, the default index with name `\jobname.ind` is typeset. Actually this command activates all the mechanism of closing the output to the raw index file, shelling out, possibly calling the *splitindex* script in order to divide the single raw file generated by *(pdf)latex* into distinct raw files according to the default or specified *⟨name⟩*s for each index, calling the sorting and formatting program on each of these split raw files (unless inhibited by a *noautomatic* option; in which case a warning is issued in order to remember the typesetter that this particular index has not been processed), producing the sorted and formatted `.ind` files, and eventually inputs and typesets these formatted files. Deep breath.

Let's see an example. The sequence of commands

```

...
\usepackage{imakeidx}
...
\makeindex[title=Concept index]
\makeindex[name=persons,title=Index of names,columns=3]
...
\begin{document}
...
...relativity\index{relativity}...
...
... Einstein\index[persons]{Einstein, Albert}...
...
And this is the end of the story.

\printindex

\indexprologue{\small In this index you'll find only
  famous people's names}
\printindex[persons]
\end{document}

```

will produce two indices. Entries for either index must be typed as shown above. The prologue will be printed (full text width) only in the “Index of names”, which will be typeset in three columns.

When the `original` option is set, maybe implicitly because of `twocolumn`, `\indexsetup` and the keys `columns`, `columnsep` and `columnseprule` for `\makeindex` have no effect.

4 If something goes wrong

Since `imakeidx` relies on good cooperation between package options and command line options for the \LaTeX run, in some cases it may happen that the indices are not correctly built or built at all.

If you use only `makeindex` and \TeX Live 2010 or later, then you shouldn't need anything special, since `makeindex` is among the safe programs allowed to be called during a \LaTeX run, be it `latex`, `pdflatex`, `xelatex`, or `lualatex`. When the options `splitindex`, `xindy`, `texindy` or `truexindy` are specified (globally or locally), the \LaTeX run should be called with the unrestricted `-shell-escape` (which is `-enable-write18` for \MiKTeX) typesetting program option or the `noautomatic` option should be specified when loading `imakeidx`.

Let's look at a couple of examples. In both we suppose that the document `mybook.tex` defines two indices through

```

\makeindex[...]
\makeindex[name=secondary,...]

```

where `...` denotes possible options excluding `name`.

First of all we examine the case when `imakeidx` is called *without* `splitindex`. Two files called `mybook.idx` and `secondary.idx` will be written during the \LaTeX run. At the corresponding `\printindex` command, *makeindex* will act on each of them producing the files `mybook.ind`, `mybook.ilg`, `secondary.ind` and `secondary.ilg`. The `.ind` files contain the relevant `theindex` environments with alphabetized entries, while in the `.ilg` files *makeindex* will write its log. You can check in `mybook.log` whether the *makeindex* run has been executed by searching for a line

```
runsystem(makeindex <...>)...executed
```

where `<...>` stands for the rest of the command line in the particular case. If this line is not present, then *makeindex* has not been called; this happens when you didn't specify the shell escape command line option for the \LaTeX run or the restricted shell escape is not active; also, of course, if you set the `noautomatic` option for the index.

When using *splitindex*, the situation is different. During the \LaTeX run, only a large index file called `mybook.idx` file gets written; the first `\printindex` command will call *splitindex* (unrestricted shell escape *must* be active), which will produce the two partial index files `mybook-mybook.idx` and `mybook-secondary.idx`. These two files will be processed by *makeindex* producing the four files `mybook-mybook.ind`, `mybook-mybook.ilg`, `mybook-secondary.ind` and `mybook-secondary.ilg`. The line

```
runsystem(splitindex <...>)...executed
```

in `mybook.log` will tell that the splitting has been done (see later on if this doesn't seem true). In table 1 you can see what files are produced when the first two lines are in the preamble.

Everything is the same when using *texindy* for alphabetizing, except that, by default, it doesn't write `.ilg` files. If you want them, add `options=-t<name>.ilg` to the relevant `\makeindex` command, in our example it should be

```
\makeindex[...options=-t mybook.ilg]
\makeindex[name=secondary,...options=-t secondary.ilg]
```

The name of the `.ilg` file *must* be specified. Remember, though, that *xindy* `.ilg` files may turn out to be very large.

When something different from expected appears to take place, check also the time stamps of the produced files; if they are older than `mybook.log`, it means that they have not been written in the last run. The most common case is that you forgot to activate the shell escape feature (which is not necessary with \TeX Live 2010 or later, provided you use only *makeindex*).

Another cause of malfunction might be a wrong option passed to *makeindex*, *texindy* or *splitindex*. For example, if you specify a style option for *makeindex* such as `options=-s mystyle.ist` and the style file is missing or its name is mistyped, the run of *makeindex* will result in `mybook.log`, but it will be aborted and the \TeX program has no control over this process. In this case the `.ilg` and `.ind` files

\makeindex \makeindex[name=secondary]		
	without <code>splitindex</code>	with <code>splitindex</code>
(at <code>\begin{document}</code>)	mybook.idx secondary.idx	mybook.idx
(at <code>\printindex</code>)	mybook.ind mybook.ilg secondary.ind secondary.ilg	mybook-mybook.idx mybook-secondary.idx mybook-mybook.ind mybook-mybook.ilg mybook-secondary.ind mybook-secondary.ilg

Table 1: Files written during a L^AT_EX run

will not be produced and you can spot the problem by checking the time stamps. On some systems a message such as

```
Index file mystyle.ist not found
Usage: makeindex [-ilqrcgLT] [-s sty] [-o ind] [-t log] [-p num]
```

may appear on the screen, but often this window gets closed before you realize you have a problem. The time stamp is the best clue to detect such problems.

Shell hackers may be able to redirect the `stderr` stream to a file, but this requires skills that can't be explained here, because they require tens of different tricks, depending on what method is used to start a L^AT_EX run. From the command line, assuming *bash*, it would be something like

```
pdflatex -shell-escape mybook.tex 2>latex-errors
```

If shell hackers know a way to access the exit status of the called program, we'd be glad to implement a supplementary check.

5 Hints

Actually this package reaches two goals: (a) it typesets the indices of a specific document in just one run, and (b) it lets the author/typesetter produce documents with multiple indices.

5.1 Conflicts

5.1.1 Class *memoir*

The first public version of this package was not compatible with the `memoir` class. Since version 1.1 it is; however, one has to keep in mind that all index processing is done with the methods of the present package, and *not* with `memoir`'s; however the syntax used is the same and there should be no problem.

5.1.2 Package `showidx`

Up to version 1.1 this package did not allow to use it together with the `showidx` package; now it is, provided that `showidx` is loaded *before* `imakeidx`. See below more information on using `showidx`.

5.1.3 Package `fancyhdr`

When using package `fancyhdr` some inconveniences did show up; now we believe we have detected the causes and we implemented the necessary corrections¹.

5.1.4 Package `combine`

Apparently there might be some conflicts with package `combine`, because this package redefines the contents of `\jobname`; we tried to control this behavior, and made the necessary patches, but it is still necessary to load this package `imakeidx` *before* package `combine`.

5.1.5 Package `ledmac`

Some users reported some conflicts with package `ledmac`; in order to mark with an italic ‘n’ the pages where the reference was made in one of the footnotes, it is necessary to use the package `etoolbox` and its command `\pretocmd`; actually it is not necessary to load `etoolbox`, because this `imakeidx` provides for it:

```
...
\usepackage{letltxmacro}
\usepackage{imakeidx}
...
\makeatletter
\LetLtxMacro\orig@@index\index
\let\orig@@index\index
\newcommand\nindex[1]{\orig@@index{#1|innote}}
\newcommand\innote[1]{#1\textit{n}}
...
\makeindex[...]
...
\AtBeginDocument{%
  \pretocmd{\@footnotetext}{\let\index\nindex}{-}{-}
```

¹Thanks to Maïeul Rouquette, who spotted the problems and also suggested some patches.

}

We did not apply this patch directly because we tried to avoid possible conflicts that might show up when loading other packages. Therefore we simply show what to do in case it might be necessary.

5.2 Index layout customization

If you redefine yourself the `theindex` environment, please remember not to number the chapter or section that introduces the index if you ask for the `intoc` option; either use the commands `\chapter*` or the `\section*` respectively and the `intoc` option or don't use this option and redefine your `theindex` environment with numbered chapter or section commands, that will put the index titles directly into the table of contents. See below the effect of the `\backmatter` declaration. You may use the `idxlayout` package by Thomas Titz, which offers many functions for index typesetting customization and is compatible with our package; remember to load `idxlayout` after `imakeidx`. This package has a similar function to our `\indexprologue`, called `\setindexprenote`; however `idxlayout` doesn't reset the index prologue, which must be declared anew or disabled with `\noindexprenote` before the next `\printindex` command. In any case take into serious consideration what is being said hereafter about customizations.

5.3 Index page customization

The same, more or less, holds true if you customize your headings; `imakeidx` can deal with standard settings, but it generally cannot deal with personal stylings and customizations. This is why if you load `fancyhdr`, some of the `\indexsetup` settings may be disabled.

When you make any kind of customization, remember that there are several class or personal settings or features that may render your customization very difficult to handle.

Remember that:

- There are classes where the normal usable highest sectioning command, disregarding `\part`, is not `\chapter`, but `\section`; for example class *article*, *scrartcl*.
- Sectioning commands come in two varieties: starred and unstarred; the former ones are not numbered and do not produce any entry in the headings and in the table of contents; the latter ones may behave differently according to the next list entry.
- There are some classes (for example *book*, *scrapbook*, *memoir*,...) that have the special "sectioning" declarations `\fontmatter`, `\mainmatter`, and `\backmatter` modify how the unstarred sectioning commands behave for what concerns the heading and the table of contents entries.

For what concerns indices, these are generally typeset at the document end. This means that the `\backmatter` declaration may be in force; in this case

unstarred sectioning commands are not numbered but they produce normal headings and table of contents entries.

- Heading entries are used by the output routine paging algorithm in such a way as to extract the left or the right part from suitable “marks”; for the even (left) pages the required information is extracted from the `\topmark` or `\firstmark`, while for the odd (right) pages they are extracted from the `\botmark`. Generally speaking, the even page heading refers to `\leftmark` and odd page headings refer to `\rightmark`; there are the two commands that extract the correct part from the suitable marks. But when you use the *headers* value you specify two brace balanced strings that are loaded through `\markboth` as the left and right part of the current mark.
- The contents of the marks may be very varied; they are generally made up of two brace balanced strings, which in turn may contain other brace balanced strings that may be used in different ways by the selected page style and by the page style definitions of the macros `\chaptermarks`, `\sectionmarks`, and `\subsectionmarks` that may interfere with personal customizations.
- Remember also that things change in an obvious way when one side type-setting is chosen; all a pages are treated as if they were odd ones; therefore any customization must take into account also this aspect.

The above list has not been written down for discouraging customizations of any kind: simply it recall what must be taken care of in order to create one’s customization in a proper way.

The above list explains why we disabled the commands tied to the `\indexsetup` keys *headings* and *firstpagestyle* when package `fancydr` is being used; you may even set up these keys, but if the `fancyhdr` package has been load, we disable their action; this implies that any fancy customization must be done before starting to print any index.

The *intoc* must also be used with care, as well as the starred or unstarred sectioning commands for the *level* and *toclevel* values. They must be chosen according to what the possible `\backmatter` declaration sets up, in order to avoid double entries in the table of contents; the `\backmatter` settings may also influence the way heading information is being used, and this makes it even more stringent to set up any index page style customization before starting to print any index.

Therefore if by chance you get double entries into the table of contents, eliminate the *intoc* option from your calls; your class, packages, and settings are already taking care of it.

The package `tocbibind` should be loaded with the `noindex` option, otherwise it would interfere with our redefinition of `theindex`.

If you redefine your `theindex` environment by means of other packages, pay attention that these redefine a real `theindex` environment with this very name; if they create an environment with a different name, `imakeidx` can’t take care of the indices production (in particular the T_EX system program *makeindex* creates a sorted and formatted `.ind` file that refers explicitly to the `theindex` environment),

and it can't take care of the table of contents entry and of the position of the hyper link anchors needed to navigate your document by means of hyper links.

5.4 Using the showidx package

If you want to make use of the `showidx` facilities, remember to load that package *before* `imakeidx`; remember also to disable or comment out the call to `showidx` when you typeset the final version of your document. This constraint is due to the fact that `showidx` redefines several internal commands, some of which have to receive the `imakeidx` definition in order to perform as described in this documentation.

5.5 Index List sectioning customization

Use freely the options and the key values in order to reach the desired results, but you are advised to prepare in advance the styles for composing the various indices in a proper way; for example, if you use a titled style for the index, where the index sections are distinguished with a bold face title or alphabetic letter, you have to set up a `.ist` file, such as `myindexstyle.ist`, made up like this:

```
headings_flag 1
heading_prefix "\\par\\penalty-50\\textbf{"
heading_suffix "}\\\\\\*\\~\\\\\\*\"
symhead_positive "Symbols"
symhead_negative "symbols"
numhead_positive "Numbers"
numhead_negative "numbers"
delim_0 ",\\~"
```

where the numeric and non alphabetic entries have different titles. But, say, you are making also an index where the entries are file names, and for some names only the extension is entered; the extensions start with a dot, so the sorting program will sort these names at the beginning of the sorted index file, but you won't like to have a title such as "Symbols"; you probably prefer to have a title such as "Extensions"; therefore you have to prepare a different index style file, such as this one:

```
headings_flag 1
heading_prefix "\\par\\penalty-50\\textbf{"
heading_suffix "}\\\\\\*\\~\\\\\\*\"
symhead_positive "Extensions"
symhead_negative "extensions"
numhead_positive "Numbers"
numhead_negative "numbers"
delim_0 ",\\~"
```

This done, besides requiring the use of this package, you have to declare the `\makeindex` command with the necessary options; pay a particular attention to the options that involve the index symbolic name, the index title, the index style, the fact that the index titles shall appear in the table of contents, and if you

are preparing an e-book, you probably would like to hyper link both the page numbers and the index titles to the proper locations. The typesetting program will do everything for you but be careful not to confuse it with illogical index entries.

Especially with multiple indices it is important that you are consistent in putting the right information in the right index and with a consistent mark-up. Define yourself appropriate macros so that, for example, personal names are consistently typeset, say, in caps and small caps and are entered into a specific index; you may even create one command to typeset the name in the document and replicate the same name in the index.

Of course there is no program that can decide at your place what and where to index each piece of information; this is a task for humans. Soooooo...

HAPPY T_EXING!

6 Implementation

The heading to the file is in common with the documentation file, and has already been taken care of. But we require the `xkeyval` package, in order to handle the key-value lists.

Notice that in order to create a specific name space so as to avoid possible conflicts with other packages, all the commands defined in this package are prefixed with the string `imki@`.

```
1 \RequirePackage{xkeyval}
```

We define the various options and their defaults. After `\ProcessOptions`, we set anyway the `original` option if the document class has been given the `twocolumn` option, which is incompatible with `multicol`. We define also an internal alias for `\immediate\write18`, a rudimentary check for the typesetting engine and a macro for modifying the command line call to *splitindex*. The `xpatch` is requested; at the moment none of its features are used, but it calls `etoolbox`, whose facilities are used here; while future extensions will benefit from the extended patched commands, that strongly enrich the performances of the main package `etoolbox`.

```
2 \DeclareOption{xindy}{\def\imki@progdefault{texindy}}
3 \DeclareOption{texindy}{\def\imki@progdefault{texindy}}
4 \DeclareOption{truexindy}{\def\imki@progdefault{truexindy}}
5 \DeclareOption{makeindex}{\def\imki@progdefault{makeindex}}
6 \newif\ifimki@disableautomatic
7 \DeclareOption{noautomatic}{\imki@disableautomatictrue}
8 \newif\ifimki@nonewpage
9 \DeclareOption{nonewpage}{%
10 \imki@nonewpagetrue\imki@disableautomatictrue
11 }
12 \newif\ifimki@splitindex
13 \DeclareOption{splitindex}{\imki@splitindextrue}
14 \newif\ifimki@original
15 \DeclareOption{original}{\imki@originaltrue}
```

```

16 \DeclareOption{quiet}{\AtEndOfPackage{%
17   \let\imki@finalmessage\@gobble
18   \let\imki@splitindexmessage\relax}}
19 \ExecuteOptions{makeindex}
20 \ProcessOptions\relax
21
22 \if@twocolumn\imki@originaltrue\fi
23 \def\imki@exec{\immediate\write18}
24 \def\imki@engine{(pdf)latex}
25 \ifdefined\XeTeXversion\def\imki@engine{xelatex}\fi
26 \ifdefined\directlua % luatex doesn't have \pdfshellescape
27   \def\imki@engine{lualatex}
28   \ifnum\luatexversion<68
29     \chardef\imki@shellescape\@ne % no way to know the value
30   \else
31     \RequirePackage{pdftexcmds} % provides \pdfshellescape
32     \chardef\imki@shellescape\pdfshellescape
33   \fi
34   \let\imki@exec\pdf@system
35 \fi
36 \RequirePackage{xpatch}
37 \edef\imki@splitindexoptions{-m \string"\string"}
38 \def\splitindexoptions#1{\g@addto@macro\imki@splitindexoptions{ #1}}
39 \@onlypreamble\splitindexoptions

```

While experimenting we found out that some classes or packages are either incompatible with this one, or must be faked in order to pretend they have been loaded.

There is a serious incompatibility with the `memoir` class. In facts `memoir` puts all index entries in the main `.aux` file and extracts them to the various raw index files at `\end{document}` time. This means that no raw index file output stream has been defined, and therefore this package can't close it; moreover it can't typeset the indices before `\end{document}` because they are not yet available. Therefore if `memoir` is the active class, we will hijack its index mechanism replacing it with ours.

On the opposite we pretend that package `makeidx` or package `multind` have been loaded, so that `hyperref` can play with their commands, that are substantially the same as those used here. By so doing those packages are inhibited from being loaded after this one.

```

40 \@namedef{ver@makeidx.sty}{3000/12/31}
41 \@ifpackageloaded{multind}
42   {\PackageError{imakeidx}{Incompatible package 'multind' loaded}
43     {This package is incompatible with multind, don't load both.%
44       \MessageBreak\@ehc}}
45   {\@namedef{ver@multind.sty}{3000/12/31}}

```

At the same time we redefine some commands defined by `makeidx` and we define the default English names for the `\see` and `\seealso` commands. We use `\providecommand` so that, if `makeidx` has already been loaded, we do not redefine

things that have already been defined.

```

46 \providecommand*\see[2]{\emph{\seename} #1}
47 \providecommand*\seealso[2]{\emph{\alsoname} #1}
48 \providecommand*\seename{see}
49 \providecommand*\alsoname{see also}

```

From here on, some commands are duplicated; this depends on the fact that the behavior must be different when using *splitindex* or not. The memory occupied by the useless commands will be cleared at the end of package.

```

50 \providecommand*\makeindex{} % to use \renewcommand safely
51 \renewcommand{\makeindex}[1][\imki@makeindex{#1}]{}
52 % \@onlypreamble\makeindex % Already in latex.ltx

```

This package implementation of `\makeindex` sets default values for the keys, then evaluates its argument (which is the optional argument to `\makeindex`) and calls two other macros. After that we have to reset the defaults.

```

53 \def\imki@makeindex#1{%
54   \edef\imki@name{\jobname}%
55   \def\imki@title{\indexname}%
56   \edef\imki@program{\imki@progdefault}%
57   \let\imki@options\space
58   \KV@imki@noautomaticfalse\KV@imki@intocfalse
59   \setkeys{imki}{#1}%
60   \ifimki@splitindex\KV@imki@noautomaticfalse\fi
61   \imki@build\imki@name
62   \imki@startidx\imki@name
63   \imki@resetdefaults
64 }

```

Here are the keys. As usual, the `imki@` prefix is used to distinguish anything that is being defined in this package, even the keys.

```

65 \define@key{imki}{name}{\def\imki@name{#1}}
66 \define@key{imki}{title}{\def\imki@title{#1}}
67 \define@choicekey{imki}{program}[\imki@val\imki@nr]
68 {makeindex,xindy,texindy,truexindy}{%
69   \ifcase\imki@nr\relax
70     \def\imki@program{makeindex}%
71   \or
72     \def\imki@program{texindy}%
73   \or
74     \def\imki@program{texindy}%
75   \or
76     \def\imki@program{xindy}%
77   \fi}
78 \define@key{imki}{options}{\def\imki@options{ #1 }}
79 \define@boolkey{imki}{noautomatic}[true]{%
80 \define@boolkey{imki}{intoc}[true]{%
81 \define@key{imki}{columns}{\def\imki@columns{#1}}
82 \define@key{imki}{columnsep}{\def\imki@columnsep{#1}}
83 \define@boolkey{imki}{columnseprule}[true]{%

```



```

84 \def\imki@resetdefaults{%
85   \def\imki@options{ }%
86   \def\imki@columns{2}\def\imki@columnsep{35\p}%
87   \KV@imki@columnseprulefalse
88   \KV@imki@intocfalse\KV@imki@noautomaticfalse}
89 \imki@resetdefaults

```

The control sequence `\imki@build` defines a control sequence to hold the setup for an index to be used when the index is sorted and printed

```

90 \def\imki@build#1{%
91   \toks@{}%
92   \imki@dokey\imki@title
93   \imki@dokey\imki@program
94   \imki@dokey\imki@options
95   \imki@dokey\imki@columns
96   \imki@dokey\imki@columnsep
97   \ifKV@imki@noautomatic
98     \addto@hook\toks@{\KV@imki@noautomatictrue}%
99   \else
100    \addto@hook\toks@{\KV@imki@noautomaticfalse}%
101  \fi
102  \ifKV@imki@intoc
103    \addto@hook\toks@{\KV@imki@intoctrue}%
104  \else
105    \addto@hook\toks@{\KV@imki@intocfalse}%
106  \fi
107  \ifKV@imki@columnseprule
108    \addto@hook\toks@{\KV@imki@columnsepruletrue}%
109  \else
110    \addto@hook\toks@{\KV@imki@columnseprulefalse}%
111  \fi
112  \expandafter\edef\csname imki@set@#1\endcsname{\the\toks@}%
113 }

```

Command `\imki@dokey` receives as argument the text of the values assigned to certain keys, and adds them to the options token list.

```

114 \def\imki@dokey#1{%
115   \expandafter\addto@hook\expandafter\toks@\expandafter{%
116     \expandafter\def\expandafter#1\expandafter{#1}}

```

Command `\imki@startidx` defines the output stream(s); the macro with suffix `split` is used when *splitindex* is not enabled, the one with suffix `unique` is used otherwise. In the case of many indices, the symbolic name for an index named ‘pippo’ is `\pippo@idxfile` corresponding to the file `pippo.idx`. When *splitindex* is enabled, the only output stream is called `\@indexfile` as in standard L^AT_EX, corresponding to `\jobname.idx`.

```

117 \def\imki@startidxsplit#1{%
118   \if@files
119     \def\index{\@bsphack
120       \ifnextchar [{\@index}{\@index[\imki@name]}}

```

```

121 \expandafter\newwrite\csname #1@idxfile\endcsname
122 \immediate\openout \csname #1@idxfile\endcsname #1.idx\relax
123 \typeout{Writing index file #1.idx}%
124 \fi}

```

We define a switch which is set to true when a `\makeindex` command is given: with *splitindex* we open only one stream.

```

125 \newif\ifimki@startedidx
126 \def\imki@startidxunique#1{%
127   \if@filesw
128     \ifimki@startedidx\else
129       \newwrite\@indexfile
130       \immediate\openout\@indexfile\imki@name.idx%
131       \global\imki@startedidxtrue
132     \fi
133     \def\index{\@bsphack
134       \@ifnextchar [{\@index}{\@index[\imki@name]}}
135     \expandafter\let\csname #1@idxfile\endcsname\@empty
136     \typeout{Started index file #1}%
137   \fi}

```

Provide a default definition for `\index`; when a `\makeindex` command is given and L^AT_EX is writing on auxiliary files, `\index` will be redefined, as seen before. When index files are written, `\index` always calls `\@index`. Some code is borrowed from `memoir.cls`, but heavily modified. We want `\@wrindex` to be defined with two arguments, so that `hyperref` can hook into it just like it does with the similar commands defined by the old packages `multind` and `index`.

```

138 \renewcommand{\index}[2] []{\@bsphack\@esphack}
139 \def\@index[#1]{%
140   \@ifundefined{#1@idxfile}%
141   {\PackageWarning{imakeidx}{Undefined index file ‘#1’}%
142     \begingroup
143     \@sanitize
144     \imki@nowrindex}%
145   {\edef\@idxfile{#1}%
146     \begingroup
147     \@sanitize
148     \@wrindex\@idxfile}}
149 \def\imki@nowrindex#1{\endgroup\@esphack}

```

Command `\@wrindex` must be duplicated; we have to call it the same as usual in order to support `hyperref`. But the real name will be given at the end. We have to define a switch to allow the use of the `showidx` facilities. We define also a helper macro so as to do the right thing so as to show the index file name to which a certain index entry is going to be written; the idea is to prefix the index entry with the actual name of the specific index, except in the case of the default index, where the name is set to `\jobname`. Since the control sequence is a primitive command, its value cannot be directly compared in the `\ifx` sense to the current macro represented by argument `#1`. therefore we need a further helper control sequence `\imki@jobname` that contains the value assigned to `\jobname`.

```

150 \newif\ifimki@showidx
151 \@ifpackageloaded{showidx}{\imki@showidxtrue}{\imki@showidxfalse}
152 \edef\imki@jobname{\jobname}
153 \newcommand\imki@showidxentry[2]{\ifimki@showidx
154 \@showidx{\ifdefequal{\imki@jobname}{#1}{\{[#1]\space}#2}%
155 \fi}
156 \def\imki@wrindexsplit#1#2{%
157 \expandafter\protected@write\csname#1@idxfile\endcsname{}%
158 {\string\indexentry{#2}{\thepage}}%
159 \endgroup\imki@showidxentry{#1}{#2}%
160 \@esphack}
161 \def\imki@wrindexunique#1#2{%
162 \protected@write\@indexfile{}%
163 {\string\indexentry{#1}{#2}{\thepage}}%
164 \endgroup\imki@showidxentry{#1}{#2}%
165 \@esphack}

```

Compilation of the indices is disabled if `-shell-escape` has not been given or the restricted mode is not active; in this case we emit a warning. \TeX has `\shellescape` instead of `\pdfshellescape`, so we take care of this (hoping that users or packages don't define a `\shellescape` command). In any case we define an internal version of this command. In the case of *luatex* we can't emit the proper messages if *luatex* is not version 0.68 or later. The conditional `\ifKV@imki@noautomatic` is defined by `\define@boolkey` above.

```

166 \def\imki@shellwarn{}
167 \ifdefined\imki@shellescape % luatex
168 \else
169 \@ifundefined{shellescape}
170 {\let\imki@shellescape\pdfshellescape} % pdftex
171 {\let\imki@shellescape\shellescape} % xetex
172 \fi
173 \ifnum\imki@shellescape=\z@
174 \let\KV@imki@noautomaticfalse\KV@imki@noautomatictrue
175 \KV@imki@noautomatictrue
176 \def\imki@shellwarn{\MessageBreak or call \imki@engine\space with
177 -shell-escape}
178 \fi

```

Do the same if *noautomatic* has been given as an option.

```

179 \ifimki@disableautomatic
180 \let\KV@imki@noautomaticfalse\KV@imki@noautomatictrue
181 \KV@imki@noautomatictrue
182 \fi

```

Now we set up the `theindex` environment. If the `original` option is set, we simply patch the class definition in order to call the macro that does the work related to the table of contents. Otherwise we define a new `theindex` environment, based on the standard, but using, if the number of columns is greater than one, the `multicols` environment. Users needing a different setup can use the `\indexsetup` command. Before doing so, though, we need to disable certain features if the

package fancyhdr is loaded sometimes before the `\begin{document}` statement, be it before or after loading imakeidx. If that package is loaded we have to patch the definition of the environment `theindex`, because its default commands interfere with those defined here that work perfectly when fancyhdr is not loaded. This patching could be defined further on, but if it stay close to what has to be patched, it's easier to understand it's operation.

```

183 \newif\ifimki@fancyhdr
184 \AtBeginDocument{\ifpackageloaded{fancyhdr}{\imki@fancyhdrtrue}{\imki@fancyhdrfalse}}%
185 \ifimki@fancyhdr
186     \patchcmd{\theindex}{\imki@indexheaders}{\relax}{}{}%
187     \patchcmd{\theindex}{\thispagestyle}{\@gobble}{}{}%
188 %
189 \ifimki@original
190 \expandafter\def\expandafter\theindex\expandafter{\expandafter
191     \imki@maybeaddtotoc\theindex}
192 \else
193 \global\let\imki@idxprologue\relax
194 \RequirePackage{multicol}
195 \renewenvironment{theindex}
196     {\imki@maybeaddtotoc
197     \imki@indexlevel{\indexname}\imki@indexheaders
198     \thispagestyle{\imki@firstpagestyle}%
199     \ifnum\imki@columns>\@ne
200         \columnsep \imki@columnsep
201         \ifx\imki@idxprologue\relax
202             \begin{multicols}{\imki@columns}
203         \else
204             \begin{multicols}{\imki@columns}[\imki@idxprologue]
205         \fi
206     \else
207         \imki@idxprologue
208     \fi
209     \global\let\imki@idxprologue\relax
210     \parindent\z@
211     \parskip\z@ \@plus .3\p@\relax
212     \columnseprule \ifKV@imki@columnseprule.4\p@\else\z@\fi
213     \raggedright
214     \let\item\@idxitem
215     \imki@othercode}
216     {\ifnum\imki@columns>\@ne\end{multicols}\fi
217 }
218 \fi

```

The command `\indexsetup` may be used to customize some aspects of index formatting.

```

219 \def\imki@indexlevel{%
220     \ifundefined{chapter}{\section}{\chapter}*}
221 \define@key{imki@index}{level}{\def\imki@indexlevel{#1}}
222 \def\imki@toclevel{%

```

```

223 \@ifundefined{chapter}{section}{chapter}}
224 \define@key{imkiindex}{toclevel}{\def\imki@toclevel{#1}}
225 \define@boolkey{imkiindex}{noclearpage}[true]{\let\imki@clearpage\relax}
226 \def\imki@indexheaders{%
227   \mkboth{\MakeUppercase\indexname}{\MakeUppercase\indexname}}
228 \define@key{imkiindex}{headers}{\def\imki@indexheaders{\markboth#1}}
229 \def\imki@firstpagestyle{plain}
230 \define@key{imkiindex}{firstpagestyle}{\def\imki@firstpagestyle{#1}}
231 \let\imki@othercode\relax
232 \define@key{imkiindex}{othercode}{\def\imki@othercode{#1}}
233 \newcommand{\indexsetup}[1]{%
234   \ifimki@original\else\setkeys{imkiindex}{#1}\fi}
235 \@onlypreamble\indexsetup

```

The command `\indexprologue` sets the internal version which is always `\let` to `\relax` during `\begin{theindex}`.

```

236 \newcommand{\indexprologue}[2][\bigskip]{%
237   \long\gdef\imki@idxprologue{{#2\par#1}}

```

Now we provide the relevant `\printindex` macros by transferring the real job to a secondary macro `\imki@putindex` after due checks and messages.

```

238 \providecommand*\printindex{}
239 \renewcommand*\printindex[1][\imki@name]{%
240   \@ifundefined{#1@idxfile}{\imki@error{#1}}{\imki@putindex{#1}}}
241
242 \def\imki@error#1{%
243   \def\@tempa{#1}\def\@tempb{\imki@name}%
244   \ifx\@tempa\@tempb
245     \let\imki@optarg\@empty
246   \else
247     \def\imki@optarg{#1}%
248   \fi
249   \PackageError{imakeidx}
250     {Misplaced \protect\printindex\imki@optarg}
251     {You are not making this index, as no appropriate
252       \protect\makeindex\MessageBreak
253       command has been issued in the preamble.}}

```

We define a command to do a `\cleardoublepage` if the option *openright* is active (in classes where *twoside* is meaningful). In case `\chapter` is defined but not `\if@openright`, we assume that the class wants “open right”.

```

254 \def\imki@clearpage{%
255   \@ifundefined{chapter}
256     {\clearpage} % article and similar classes
257     {\@ifundefined{if@openright}
258       {\cleardoublepage}
259       {\if@openright
260         \cleardoublepage
261       \else
262         \clearpage
263       \fi}

```

```
264    }}
```

We need a helper macro to do a check in order to avoid a loop and the hook where to insert the table of contents related stuff.

```
265 \def\imki@check@indexname{\indexname}
266 \providecommand*\imki@maybeaddtotoc{}
```

Two helper macros for preparing the final messages to the user.

```
267 \def\imki@finalmessage#1{%
268   \expandafter\edef\csname imki@message#1\endcsname
269   {\imki@program\imki@options#1.idx}
270   \AtEndDocument{\PackageWarning{imakeidx}{%
271     Remember to run \imki@engine\space again after calling\MessageBreak
272     '\@nameuse{imki@message#1}'\imki@shellwarn@gobble}}}%
273 \def\imki@splitindexmessage{%
274   \AtEndDocument{\PackageWarningNoLine{imakeidx}{%
275     Remember to run \imki@engine\space again after calling\MessageBreak
276     'splitindex' and processing the indices\imki@shellwarn}}}%

```

Here is a helper macro for deciding whether to call the external utility or to issue a final message. In `\imki@makeindexname` we put the name of the only program allowed by default (*makeindex*). If the list is updated, we can supplement the list here, maybe defining a list macro; for now this is sufficient. The temporary switch `\if@tempwa` is set to true if automatic processing is possible, so that the main macro can take the appropriate action.

```
277 \def\imki@makeindexname{makeindex}
278 \def\imki@decide{%
279   \@tempwafalse
280   \ifimki@splitindex % splitindex is not "safe"
281     \ifnum\imki@shellescape=\@ne\@tempwattrue\fi
282   \else
283     \ifx\imki@program\imki@makeindexname % nor is texindy
284       \ifnum\imki@shellescape=\tw@\@tempwattrue\fi
285     \fi
286     \ifnum\imki@shellescape=\@ne\@tempwattrue\fi
287   \fi
288   \ifKV@imki@noautomatic
289     \@tempwafalse
290   \fi}

```

We now define the main macro that puts the specified index file into the document and possibly orders to add the index title to the table of contents. It is duplicated as usual. The argument `#1` is the specific symbolic name of the index. In particular if the *intoc* option has been specified, the hook `\imki@maybeaddtotoc` is defined in such a way that the relevant information is added to the `toc` file. The `\phantomsection` command is necessary when using `hyperref`; here it is hidden as argument to `\@nameuse`, so it is equivalent to `\relax` and does nothing if `hyperref` has not been loaded.

```
291 \def\imki@putindexsplit#1{%
292   \ifimki@nonewpage\else

```

```

293     \imki@clearpage
294 \fi
295 \immediate\closeout\csname #1@idxfile\endcsname
296 \let\imki@indexname\indexname % keep \indexname
297 \@nameuse{imki@set@#1}\imki@decide
298 \if@tempswa % we can call the external program
299     \imki@exec{\imki@program\imki@options#1.idx}%
300 \else
301     \imki@finalmessage{#1}%
302 \fi
303 \ifKV@imki@intoc
304     \def\imki@maybeaddtotoc{\@nameuse{phantomsection}%
305         \addcontentsline{toc}{\imki@toclevel}{\imki@title}}%
306 \else
307     \def\imki@maybeaddtotoc{}%
308 \fi
309 \ifx\imki@title\imki@check@indexname\else
310     \def\indexname{\imki@title}%
311 \fi
312 \@input@{#1.ind}
313 \let\indexname\imki@indexname % restore \indexname
314 }
315
316 \newif\ifimki@splitdone
317 \def\imki@putindexunique#1{%
318     \ifimki@nonewpage\else
319         \imki@clearpage
320     \fi
321     \let\imki@indexname\indexname % keep \indexname
322     \@nameuse{imki@set@#1}\imki@decide
323     \if@tempswa % we can call the external program
324         \ifimki@splitdone\else
325             \immediate\closeout\@indexfile
326             \imki@exec{splitindex \imki@splitindexoptions\space\imki@name.idx}%
327             \global\imki@splitdonetrue
328         \fi
329     \else
330         \ifimki@splitdone\else
331             \imki@splitindexmessage\global\imki@splitdonetrue
332         \fi
333     \fi
334     \if@tempswa % we can call the external program
335         \imki@exec{\imki@program\imki@options\imki@name-#1.idx}%
336     \fi
337     \ifKV@imki@intoc
338         \def\imki@maybeaddtotoc{\@nameuse{phantomsection}%
339             \addcontentsline{toc}{\imki@toclevel}{\imki@title}}%
340     \else
341         \def\imki@maybeaddtotoc{}%
342     \fi

```

```

343 \ifx\imki@title\imki@check@indexname\else
344   \def\indexname{\imki@title}%
345 \fi
346 \input@{\imki@name-#1.ind}
347 \let\indexname\imki@indexname % restore \indexname
348 }

```

At this point, we choose the meaning of the relevant commands, reclaiming the space occupied by the discarded ones

```

349 \ifimki@splitindex
350   \let\imki@startidx\imki@startidxunique
351   \let\@wrindex\imki@wrindexunique
352   \let\imki@putindex\imki@putindexunique
353   \let\imki@startidxsplit\@undefined
354   \let\imki@wrindexsplit\@undefined
355   \let\imki@putindexsplit\@undefined
356 \else
357   \let\imki@startidx\imki@startidxsplit
358   \let\@wrindex\imki@wrindexsplit
359   \let\imki@putindex\imki@putindexsplit
360   \let\imki@startidxunique\@undefined
361   \let\imki@wrindexunique\@undefined
362   \let\imki@putindexunique\@undefined
363 \fi

```

To end the code, we deal with memoir:

```

364 \ifclassloaded{memoir}{\let\@wrindexm\@wrindex}{}

```

The end.