Program and package xindex

–

1.02 (August 2, 2025)

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Contents

Thanks to:
Mark Baudoin; Denis Bitouzé; Andreas Deininger; Brian Dunn; Daniel Flipo; Michal Hoftich; Dohyun Kim; Mykel Kochenderfer; Alexey Kuznetsov; Frank Mittelbach; Peter Müller; Heiko Oberdiek; Matteo Paolini; Stefan Pinnow; Florent Rougon; Gonzalo Pesquero Serrano; Martin Sievers; Simon Spiegel; Jürgen Spitzmüller;

1. Introduction

The Lua program `xindex` is a unicode aware program for creating an index (`.ind`) file from an `.idx` source file. It is completely compatible to the current `makeindex` program, but can handle UTF-8, 16, 32, and 64. The LaTeX package `xindex` is a package which provides a LaTeX command which writes additional text into the index file. This text (comments and/or macros) will be accepted by the program `xindex`.

The general structure of a data element in the Lua table is:

```
data = { Entry = <text>,  -- like the input line without command \indexentry
         pages = {
                    { number  = <roman/arabic number or text>,
                      special = <macro> },  -- the part after | in the input
                    [...]
                    { number  = <roman/arabic number or text>,
                      special = <macro> }
                  },
          sortChar = <unicode codepoint>, -- of the first character of Entry
          Macro    = <TeX macro>  -- only useful with LaTeX package xindex
        }
```

After reading the input file the Lua table `pages` has only one element for the number and the so-called special command. When the pages are compressed the table will collect all pages which refer to the same entry name.

1.1. Syntax

The syntax is `xindex [...] <file(s)>` where `[...]` are optional arguments, either in short or long form which, of course, can be mixed:

```
xindex
    [-q,--quiet ]
    [-h,--help ]
    [-v ]                               verbose
    [-V,--version ]
    [-a,--no_casesensitive ]            default is false
    [-b,--no_labels ]                   default is false
    [-c,--config ]                      default is cfg
    [-e,--escapechar ]                  default is "
    [-f,--fix_hyperref ]                default is false
    [-g,--no_pagenumber]                default is false
    [-i,--ignoreSpace ]                 default is false
    [-k,--checklang ]                   default ist false
    [-l,--language ]                    default is en
```

```
[-n,--noheadings ]                    default is false
[-o,--output ]                        default is <input>.ind
[-p,--prefix]                         default L
[-s,--use_stdin ]                     default is false
<files...> (default stdin) file(s)[.idx]   one or more files
```

For example:

```
xindex -q -l fr -b myDoc
xindex -l de -c DIN2 demo1 demo2 demo3
xindex -c norsk -o index.ind demo1 demo2.bdx demo3.adx
```

1. `-q`: quiet; `-l fr`: french language setting; `-b`: no labels; `myDoc`: input data `myDoc` or `myDoc.idx`
   output data will be `myDoc.ind` and logfile `myDoc.ilg`
2. `-l de`: German language setting; `-c DIN2`: config file `xindex-DIN2.lua`; `demo1 demo2 demo3`: input data files with or without extension `.idx`
   output data will be `demo1.ind` and logfile `xindex.ilg`
3. `-c norsk`: config file `xindex-norsk.lua`; `-o index.ind`: output file; `demo1 demo2.bdx demo3.adx`: input data files with or without extension `.idx`
   output data will be `xindex.ind` and logfile `xindex.ilg`

It is also possible to use standard input for the index data, which needs the `-s` parameter:

```
cat myDoc.idx | xindex -q -l fr -b -s xindex -l de -c DIN2 < myDoc.idx
```

The language has to be chosen as an international abbreviation in lower- or uppercase letters, see https://en.wikipedia.org/wiki/ISO_3166-2

1.2. How it works

`xindex` creates by default an output file `<input>.ind` which can be read by the LaTeX document with the default command `\printindex`. One can use another output filename, which makes only sense if one doesn't use the `\printindex` command for typesetting the index. The default sorting is given by the configuration file, which defines replacements for accented characters, like `öo`.

1.3. The `.idx` file

There are three (four) characters which must be escaped if used in the command `\index`: `!`, `@`, or `|` and the current escape character itself. These characters have a special meaning for the index.

The default escape character is the double quote ". The braces { and } cannot be used as argument for the command `\index`. Use `\braceLeft` and `\braceRight` instead (defined in the package `xindex`).

xindex-1.tex

```
\usepackage{makeidx}\makeindex
\usepackage{xindex}% for \braceLeft|Right
```

```
\section{Escaping characters}
\begin{itemize}
\item Exclamation mark ! \index{Exclamation ("!)}\index{"!}
\item Vertical bar | \index{Vertical bar ("|)}\index{"|}
\item Doublequote \verb|"| \index{""}
\item Double doublequote \verb|""| \index{""""}
\item At character @ \index{At ("@)}\index{"@}
\item Left parenthesis \{ \index{\braceLeft}
\item Right parenthesis \}  \index{\braceRight}
\end{itemize}
run \texttt{xindex -l fr <file.idx>}\index{file.idx@\texttt{<file.idx>}|textit}\index{123}
\index{Etage} \index{Ètagé}
\twocolumn
\printindex
```

1 Escaping characters

- Exclamation mark !
- Vertical bar |
- Doublequote "
- Double doublequote ""
- At character @
- Left parenthesis {
- Right parenthesis }

run `xindex -l fr <file.idx>`

Index

It is by design that the braces { and } cannot be used as index entry. The *package* xindex defines the two commands `\braceLeft` and `\braceRight` which can be used instead (see examples above and and below).

For the German language the double quote is an active character and it makes life easier if one chooses another character. The escape character can be changed easily by the optional argument `-e "<char>"` or `--escapechar "<char">`. The following example shows how it works for the escape character »>« (greater). By default the expression »>>« will be a TEX ligature with the output »»«.

With the beginning of `xindex` the escaped chars are converted into the internal strings and later back to the original meaning. The two characters {} cannot be used as `\{\}` inside the argument of `\index`. The package `xindex` defines the two helper macros

```
\providecommand\braceLeft{\{}
\providecommand\braceRight{\}}
```

The following example shows how to use it:

xindex-2.tex

```
\usepackage{xindex}
\usepackage{makeidx}\makeindex
```

```
\section{Escaping characters with >}
\begin{itemize}
\item Exclamation mark ! \index{exclaim (>!)}
\item Vertical bar| \index{Vertical bar (>|)}
\item Escapechar \verb|>| \index{>>}
\item Double escapechar \verb|>>| \index{>>>>}
\item At character @ \index{At (>@)}
\item Group start \{ \index{\braceLeft}
\item Group end \{ \index{\braceRight}
\end{itemize}
Run \texttt{xindex} with \texttt{xindex -e ">" -n}\index{<file.idx>}\index{123}
\newpage
\printindex
```

1 Escaping characters with >

- Exclamation mark !
- Vertical bar|
- Escapechar >
- Double escapechar >>
- At character @
- Group start {
- Group end {

Run `xindex` with `xindex -e ">" -n`

Index

2. Language

The language is only important for the first two headers in the output of the index data. They are by default *Symbols* followed by *Numbers*. In a new version of `xindex` it will be customizable. The predefined language is »en« and currently the following languages which its alias are defined:

```
<id> = {<symbols>, <numbers>, <alias language name>, ...}
indexheader = {
  cs = {"Symboly", "Čísla", "czech"},
  da = {"Symboler", "Tal", "danish"},
  de = {"Symbole", "Zahlen", "austrian", "german", "germanb", "ngerman", "naustrian"},
  en = {"Symbols", "Numbers", "english", "USenglish", "american", "UKenglish", "british", "canadian", "australian", "n
  es = {"Símbolos", "Números", "spanish"},
  fr = {"Symboles","Nombres", "french", "francais", "canadien", "acadian"},
  it = {"Simboli", "Numeri", "italian"},
  jp = {"シンボル","番号","japanese"},
  nl = {"Symbolen", "Nummers", "dutch"},
  no = {"Symboler","Tall", "norsk", "nynorsk"},
  ru = {"Символы", "Числа", "russian"},
}
```

The following example was run with `xindex -l it <file>.idx`:

xindex-3.tex

```
\usepackage{makeidx}\makeindex
```

```
\section{Escaping simboli con >}
\begin{itemize}
\item punto esclamativo ! \index{exclaim (>!)}
\item linea verticale | \index{Vertical bar (>|)}
\item escapechar \verb|>| \index{>>}
\item doppio escapechar \verb|>>| \index{>>>>}
\item At siboli @ \index{At (>@)}
\end{itemize}
Initio \texttt{xindex} con \texttt{xindex -l it -e ">"}\index{123}
\twocolumn \printindex
```

1 Escaping simboli con >

- punto esclamativo !
- linea verticale |
- escapechar >
- doppio escapechar >>
- At siboli @

Initio `xindex` con `xindex -l it -e ">"`

Indice analitico

The following example was run with `xindex -k <file>.idx`. In this case `xindex` tries to detect the language from the aux file(s). This is only possible if package `babel` or `polyglossia` are used.

xindex-4.tex

```
\usepackage[dutch]{babel} % !!!!
\usepackage{makeidx}\makeindex
```

```
\section{Escaping characters with ?}
\begin{itemize}
\item Exclamation mark ! \index{exclaim (?!)}
\item Vertical bar| \index{Vertical bar (?|)}
\item Escapechar \verb|?| \index{??}
\item Double escapechar \verb|??| \index{????}
\item At character @ \index{At (?@)}\index{?@}
\end{itemize}
Run \texttt{xindex} with \texttt{xindex -k -e "?"}\index{123}
\twocolumn\index{xindex@\texttt{xindex}}
\printindex
```

1 Escaping characters with ?

- Exclamation mark !
- Vertical bar|
- Escapechar ?
- Double escapechar ??
- At character @

Run `xindex` with `xindex -k -e "?"`

Index

For the Russian language you have to choose the language and the config file. This allows to have different indexes with different language.

xindex-5.tex

```
\usepackage[russian]{babel}
\usepackage{fontspec}
\usepackage[regular]{newcomputermodern}
\defaultfontfeatures{Ligatures=TeX}
\usepackage{xindex}\makeindex   % run with xindex -l RU -c RU <file>
```

```
\begin{tabular}{ll}
 Хвойные: & \verb|\index{Хвойные} |\index{Хвойные}\\
\quad торрея, &
  \verb|\index{Хвойные!тисовые!торрея (Torreya)}|%
  \index{Хвойные!тисовые!торрея (Torreya) }\\
\quad тис ягодный, &
  \verb|\index{Хвойные!тисовые!тис!ягодный (Táxus baccata)}|%
 \index{Хвойные!тисовые!тис!ягодный (Táxus baccata) }\\
\quad ливанский кедр, &
  \verb|\index{Хвойные!сосновые!кедр!ливанский (Cedrus libani)}|%
  \index{Хвойные!сосновые!кедр!ливанский (Cedrus libani)}\\
\quad ель обыкновенная. &
  \verb|\index{Хвойные!сосновые!ель!обыкновенная (Pícea ábies)}|%
  \index{Хвойные!сосновые!ель!обыкновенная (Pícea ábies)}\\[2ex]
Под колючей ежевикой & \verb|\index{Ежевика (Rúbus) }|%
  \index{Ежевика (Rúbus)}\\
жил ушастый ёж. &
  \verb|\index{Ёж!ушастый (Hemiechinus auritus)}|%
  \index{Ёж!ушастый (Hemiechinus auritus)}
\end{tabular}
\printindex  % xindex -l RU -c RU -n <file>
```

Хвойные:	`\index{Хвойные}`
торрея,	`\index{Хвойные!тисовые!торрея (Torreya)}`
тис ягодный,	`\index{Хвойные!тисовые!тис!ягодный (Táxus baccata)}`
ливанский кедр,	`\index{Хвойные!сосновые!кедр!ливанский (Cedrus libani)}`
ель обыкновенная.	`\index{Хвойные!сосновые!ель!обыкновенная (Pícea ábies)}`
Под колючей ежевикой	`\index{Ежевика (Rúbus) }`
жил ушастый ёж.	`\index{Ёж!ушастый (Hemiechinus auritus)}`

Предметный указатель

3. Default sorting by the UCA (Unicode Collection Algorithm)

This Lua library from Michal Hoftich is part of TEXLive and is used by default for sorting. The supported languages and variants are listed in the file `lua-uca-languages.lua`:

af, am, ar, as, az, be, bg, bn, bs, bs_cyrl, ca, chr, cs, cy, da, de, de_din2, dsb, dz, ee, el, en, eo, es, et, fa, fi, fil, fo, fr, fr_backward_accents, ga, gl, gu, ha, haw, he, hr, hi, hsb, hu, hy, id, ig, is, it, ja, ka, kk, kl, km, kn, ko, kok, ky, lb, lkt, ln, lo, lt, lv, mk, ml, mn, mr, ms, mt, my, nb, ne, nl, nn, no, om, pa, pl, ps, pt, ro, ru, se, si, sk, sl, smn, sq, sr, sr_latn, sv, sw, ta, te, th, tk, to, tr, ug, uk, ur, uz, vi, vo, wae, wo, yi, yo, zh, zu

The sorting order can be easily modified. Read the documentation of the package `LUA-UCA` on how to do it and what languages are supported so far. Any additional code setting for UCA should be done in the file `xindex-cfg-uca.lua`, which will automatically be read by `xindex`. Language-specific sorting orders can also be defined in a config file.

xindex-6.tex

```
\usepackage{multicol}
\usepackage{makeidx}\makeindex
\def\Index#1{#1\index{#1}}

Sorted with \verb|-l cs|
\Index{ahoj} \Index{crha}, \Index{čaj}, \Index{chachar},
\Index{rak}, \Index{řeka}, \Index{srp}, \Index{šutr},
\Index{hudba}, \Index{linux}, \Index{zebra},
\Index{žába}, \Index{7 dubů}
\begin{multicols}{2} \printindex \end{multicols}
```

Sorted with `-l cs` ahoj crha, čaj, chachar, rak, řeka, srp, šutr, hudba, linux, zebra, žába, 7 dubů

Index

A
ahoj, 1

C
crha, 1

Č
čaj, 1

H
hudba, 1

Ch
chachar, 1

L
linux, 1

R
rak, 1

Ř
řeka, 1

S
srp, 1

Š
šutr, 1

Z
zebra, 1

Modifications can be done in a config file which is then loaded by the option `-c`. For example: the file `xindex-cfg-uca.lua` has modification for french and norwegian. For french the standard sorting rules `fr_backward_accents`, are a bit special and should be the default also for the language `fr`:

```
languages.fr = function(collator_obj)
   -- reverse search for accents in French (recommended):
  collator_obj.accents_backward = true
  local tailoring = function(s) collator_obj:tailor_string(s) end
  tailoring("&æ=ae")
  tailoring("&œ=oe")
  tailoring("&th<þ<<<Þ")       -- Canadian, see SGQRI004.pdf
```

```
  return collator_obj
end
```

Add any additional modifications to this file or create an own config file and load it with -c.

3.1. Examples

3.1.1. French language

xindex-7.tex

```
\usepackage{makeidx}\makeindex
\usepackage{hvindex}
```

```
\Index{CÔTÉ} \Index{cote} \Index{Côté} \Index{COTÉ} \Index{côte} \Index{COTE}
\Index{côté} \Index{Coté} \Index{coté} \Index{Cote} \Index{CÔTE} \Index{Côte}
\Index{lésé} \Index{péché}\Index{bohème} \Index{gêné} \Index{pêche} \Index{cæsium}
\Index{pêcher} \Index{révèle} \Index{pécher} \Index{révélé} \Index{Bohême} \Index{relève}
\Index{PÉCHÉ} \Index{maçon} \Index{relevé} \Index{Élève} \Index{gêne} \Index{élevé}
\Index{MÂCON} \Index{gène} \Index{Bohémien} \Index{caennais} \Index{lèse}
\Index{coexistence} \Index{cœur} \Index{coefficient} \Index{cafard}
\Index{CŒUR} \Index{CÆSIUM} \newpage \Index{coté} \Index{cœur} \Index{péché} \newpage
\Index{coté}\Index{coefficient}
\printindex
```

Index

3.1.2. German language

The default sorting where Umlauts are identical to the base latter: öo and »ßs«

xindex-8.tex

```
\usepackage{makeidx}\makeindex
\newcommand\Index[1]{\index{#1}#1}

Sorted with \verb|-l DE |\par
\Index{Österreich} \Index{Öresund}
\Index{Ostern} \Index{Ober}
\Index{Oberin} \Index{Österreich}
\Index{Öresund} \Index{Ostern}
\Index{Ober} \Index{Oberin}
\Index{Obstler} \Index{Öl}
\Index{ölen} \Index{Ödem}
\Index{Oligarch} \Index{Oder}
\Index{oder} \index{Fluss!Oder}
\index{Oder|seealso{Fluss}}
\Index{Göbel} \Index{Goethe}
\Index{Göthe} \Index{Götz}
\Index{Goldmann}

\printindex
```

Index

F

Fluss
  - Oder, 1

G

Göbel, 1
Goethe, 1
Goldmann, 1
Göthe, 1
Götz, 1

O

Ober, 1
Oberin, 1
Obstler, 1
Ödem, 1
Oder, 1, *siehe auch* Fluss
oder, 1
Öl, 1
ölen, 1
Oligarch, 1
Öresund, 1
Ostern, 1
Österreich, 1

3.1.3. German language (DIN2)

The same sorted with the language setting »German DIN variant 2«, which can be set. with `--language de_din2` or `l de_din2`. Umlauts are now converted into »öoe« and »ßss«:

xindex-9.tex

```
\usepackage{makeidx}\makeindex
\newcommand\Index[1]{\index{#1}#1}

Sorted with
\verb|-l de_din2|

\Index{Österreich} \Index{Öresund}
\Index{Ostern} \Index{Ober}

\Index{Oberin} \Index{Österreich}
\Index{Öresund} \Index{Ostern}
\Index{Ober} \Index{Oberin}
\Index{Obstler} \Index{Öl}
\Index{ölen} \Index{Ödem}
\Index{Oligarch} \Index{Oder}
\Index{oder} \index{Fluss!Oder}
\index{Oder|seealso{Fluss}}
\Index{Göbel} \Index{Goethe}
\Index{Göthe} \Index{Götz}
\Index{Goldmann}

\printindex
```

coté cœur péché

3.1.4. Japanese language

The following runs with `xindex -l jp <file>`:

```
\usepackage{makeidx}
\usepackage{hyperref}
```

```
foo\newpage
\printindex
```

指数

シンボル
//, 1

番号
4711, 1

B
bar, 1

F
foo, 1

こ
コンピュータ, 1

す
スイミングプール, 1

と
ドイツ, 1

ふ
プリンタ, 1

わ
ワープロ, 1
印刷, 1
天王, 1
広島, 1
日本, 1, 1
病院, 1
車, 1
車道, 1

xindex-10.tex

3.2. Case sensitive index entries

By default foo and Foo are two different entries and will handled differently by `xindex`: Foo will be as an own entry *before* foo. Let's see a more complex example. In the index the entry `xindex-DIN2.lua` is the first one of the `xindex-???` series because uppercase letters are sorted before lowercase letters.

```
\usepackage{makeidx}
\usepackage{hyperref}
```

```
foo\newpage
\printindex
```

Index

X
xindex package, 2, 15
xindex program, 4, 13f
xindex-cfg-common.cfg file, 9
xindex-cfg-common.lua file, 14
xindex-cfg.lua file, 6, 10
xindex-DIN2.lua file, 6
xindex-dtk.lua file, 12
xindex-HAdW-eKO.lua file, 10
xindex-newfile.lua file, 6

xindex-11.tex

The same example sorted with the `-a` or `--no_casesensitive` has another output: now `xindex-cfg-common.lua` is the first one of the `xindex-???` series.

xindex-12.tex

```
\usepackage{makeidx}
\usepackage{hyperref}
```

```
foo\newpage
\printindex
```

Index

X
xindex package, 2, 15
xindex program, 4, 13f
xindex-cfg-common.cfg file, 9
xindex-cfg-common.lua file, 14
xindex-cfg.lua file, 6, 10
xindex-DIN2.lua file, 6
xindex-dtk.lua file, 12
xindex-HAdW-eKO.lua file, 10
xindex-newfile.lua file, 6

3.3. Ignore space for sorting

By default »alpha sort« will be sorted *before* »alphaA«:

xindex-13.tex

```
\usepackage{makeidx}\makeindex
% default sorting
```

```
Test
\index{alpha sort}\index{alphaA}
\newpage
\printindex
```

Index

A
alpha sort, 1
alphaA, 1

This can be changed with the optional argument `-i` or `--ignoreSpace`:

xindex-14.tex

```
\usepackage{makeidx}\makeindex
% sort with xindex -i <file>
```

```
Test
\index{alpha sort}\index{alphaA}
\newpage
\printindex
```

Index

A
alphaA, 1
alpha sort, 1

4. Pagenumbers

4.1. Compressing pagenumber series

By default page sequences of an entry are compressed to

8f page 8 and 9

8ff page 8, 9, and 10

8-12 page 8, 9, ..., 12

The so-called folio abbreviation is language dependent and defined in the file `xindex-cfg-common.cfg`:

```
folium = {
  cs = {"f.", "ff."},
  da = {"f", "ff"},
  de = {"f", "ff"},
  en = {"f", "ff"},
  es = {"f", "ff"},
  fr = {"\\,sq.","\\,sqq."},
  it = {"f", "ff"},
jp={"シンボル","番号"},
  no = {"\\,f.","\\,ff."},
```

```
\usepackage[french]{babel}
\usepackage{makeidx}\makeindex
```

```
Sorted with \verb|-l fr|

foobar\index{foobar|(}
foo\index{foo}\index{bar}\index{baz}\newpage
foo\index{foo}\index{bar}\index{baz}\newpage
foo\index{bar}\index{baz}\newpage
foo\index{baz}\newpage
foo\index{foo}foobar\index{foobar|)}
\newpage
\printindex
```

xindex-15.tex

Index

B
bar, 1 sqq.
baz, 1–4

F
foo, 1 sq., 5
foobar, 1–5

4.2. Modify Pagenumber

Every page can be combined with an additional macro, like `\index{foo|fbox}`, the page number will be set into a framebox. If we have on the same page the two commands:

```
foo\index{foo} and foo\index{foo|bar}
```

then we have two *different* index entries which will not be compressed to one entry. In the following example we have four different entries for *foo* which is the reason that we do not get an output like `foo, 1--4`. Only the first two entries are of the same type, so we get `1f` in the output.

```
\usepackage{makeidx}\makeindex
```

```
Ein foo\index{foo} \newpage und \index{foo}
ein foo\index{foo|textit} \newpage
und foo\index{foo|textbf} \newpage
und foo\index{foo|fbox}

\newpage
\printindex
```

xindex-16.tex

Index

F
foo, 1f, *2*, **3**, 4

4.3. Supress Pagenumber

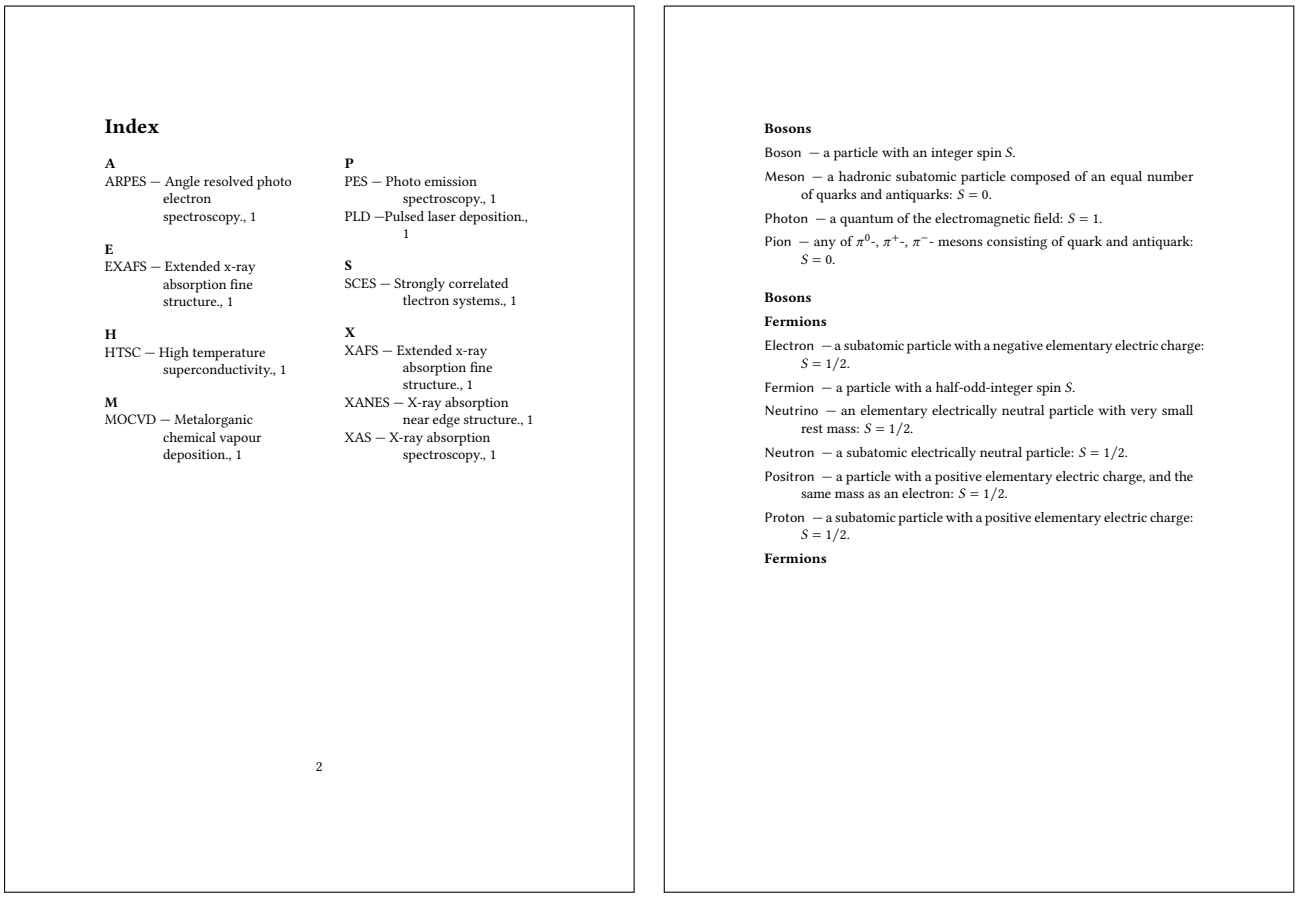
Instead of printing an index in the default way, one can also print a glossary without the pagenumbers. This is possible with the optional argument `-g` which is equivalent to the long form `--no_pagenumber`. The following example uses an own config file for the definition of the `description` environment:

```
\usepackage[english]{babel}
\usepackage[noautomatic]{imakeidx}
\makeindex
\makeindex[name=gls, options= -c description -n --no_pagenumber]
```

xindex-17.tex

```
Abbreviations:

XAS,\index{XAS --- X-ray absorption spectroscopy.}
XAFS,\index{XAFS --- Extended x-ray absorption fine structure.}
EXAFS,\index{EXAFS --- Extended x-ray absorption fine structure.}
XANES,\index{XANES --- X-ray absorption near edge structure.}
PES,\index{PES --- Photo emission spectroscopy.}
ARPES,\index{ARPES --- Angle resolved photo electron spectroscopy.}
SCES,\index{SCES --- Strongly correlated tlectron systems.}
HTSC,\index{HTSC --- High temperature superconductivity.}
MOCVD,\index{MOCVD --- Metalorganic chemical vapour deposition.}
PLD.\index{PLD ---Pulsed laser deposition.}

\smallskip Terms.

Fermions:
\index[gls]{Fermions@[Fermions]}%
\index[gls]{Fermions@[Fermions]![\sf Fermion] --- a particle with a
 half-odd-integer spin $S$.}electron,
\index[gls]{Fermions@[Fermions]![\sf Electron] --- a subatomic particle
 with a negative elementary electric charge: $S=1/2$.}proton,
\index[gls]{Fermions@[Fermions]![\sf Proton] --- a subatomic particle with a
 positive elementary electric charge: $S=1/2$.}positron,
\index[gls]{Fermions@[Fermions]![\sf Positron] --- a particle with a positive
 elementary electric charge, and the same mass as an electron: $S=1/2$.}neutron,
\index[gls]{Fermions@[Fermions]![\sf Neutron] --- a subatomic electrically
 neutral particle: $S=1/2$.}neutrino.
\index[gls]{Fermions@[Fermions]![\sf Neutrino] --- an elementary  electrically
 neutral particle with very small rest mass: $S=1/2$.}

Bosons:
\index[gls]{Bosons@[Bosons]}%
\index[gls]{Bosons@[Bosons]![\sf Boson] --- a particle with an
integer spin $S$.}photon,
\index[gls]{Bosons@[Bosons]![\sf Photon] --- a quantum of the
electromagnetic field: $S=1$.}meson,
\index[gls]{Bosons@[Bosons]![\sf Meson] --- a hadronic subatomic particle
composed of an equal number of quarks and antiquarks: $S=0$.}pion.
\index[gls]{Bosons@[Bosons]![\sf Pion] --- any of $\pi^0$-, $\pi^+$-,
 $\pi^-$- mesons consisting of quark and antiquark: $S=0$.}
```

```
\printindex
\printindex[gls]
```



Index

A
ARPES — Angle resolved photo electron spectroscopy., 1

E
EXAFS — Extended x-ray absorption fine structure., 1

H
HTSC — High temperature superconductivity., 1

M
MOCVD — Metalorganic chemical vapour deposition., 1

P
PES — Photo emission spectroscopy., 1
PLD —Pulsed laser deposition., 1

S
SCES — Strongly correlated tlectron systems., 1

X
XAFS — Extended x-ray absorption fine structure., 1
XANES — X-ray absorption near edge structure., 1
XAS — X-ray absorption spectroscopy., 1

2

Bosons

Boson — a particle with an integer spin S.

Meson — a hadronic subatomic particle composed of an equal number of quarks and antiquarks: $S = 0$.

Photon — a quantum of the electromagnetic field: $S = 1$.

Pion — any of π^0-, π^+-, π^-- mesons consisting of quark and antiquark: $S = 0$.

Bosons

Fermions

Electron — a subatomic particle with a negative elementary electric charge: $S = 1/2$.

Fermion — a particle with a half-odd-integer spin S.

Neutrino — an elementary electrically neutral particle with very small rest mass: $S = 1/2$.

Neutron — a subatomic electrically neutral particle: $S = 1/2$.

Positron — a particle with a positive elementary electric charge, and the same mass as an electron: $S = 1/2$.

Proton — a subatomic particle with a positive elementary electric charge: $S = 1/2$.

Fermions

5. The config file

The main config file is `xindex-cfg.lua` and used by default. A new config file must have the prefix `xindex-` and the file extension `.lua`, for example: `xindex-HAdW-eKO.lua` which can be used with `--config HAdW-eKO`. The file must be saved in the documents directory or in one which is known to `kpsewhich`, for example[1] `$TEXMFLOCAL/tex/lualatex/xindex/` Do not forget to update the filename database.

A new config file must declare at least the variables which are part of the default config file: the translation tables and

The new config file can define own functions for compressing the pagelist for a given entry and for the formatting of the output. They must be called `specialCompressPageList` and `specialGetPageList`.

For example:

The above code is a special function which can handle page numbers like VII-17, VIII/2/1-186. Internally exists a function `compressPageList` which is used if no `specialCompressPageList` is defined.

```
\usepackage{makeidx}
```

```
\mbox{}\printindex
```

xindex-18.tex

[1] The directory `xindex` must be created before saving the file.

Personenverzeichnis

A

Aachen, Johannes von ..... VII/1 : 215
Aarones ..... VII/2/1 : 1003, 1012
Abrahamson ..... VII/2/1 : 864, 991, 1048, 1067, 1156
Adamson ..... VII/2/1 : 1223, IX/1 : 1228
Adrian
- Hauster ..... VII/1 : 514, XI/1 : 515

Alting
- Mensa ..... VII/1 : 426, 434, 453, 455, 466f.

B

Braunschweig-Wolfenbüttel
- Karl Viktor von, Herzog ..... VI/1 : 83

Bremen
- Heinz von, Erzbischof ..... *see* Sachsen-Lauenburg

J

Julian
- Apostata, römischer Kaiser ..... VII/2/1 : 904

Justinian I., byzantinischer Kaiser ..... VII/1 : 326, 734, VII/2/1 : 1011

K

Karl
- II., Kaiser ..... VII/1 : 147
- III., Kaiser ..... VII/1 : 149
- IV., Kaiser ..... VI/1 : 12, VII/1 : 34, 147
- V., Kaiser ..... VI/1 : 84, 284, 654, VI/2 : 708, 1014, 1043, 1131, 1210, VII/1 : 34
- VI., Kaiser ..... VII/1 : 296
- IX., Kaiser ..... VII/1 : 296
- X., Kaiser ..... VII/1 : 149
- der Große, Kaiser ..... VI/2 : 987, 989, 1028

O

Osnabrück
- Heinz von, Bischof ..... *see* Sachsen-Lauenburg

S

Schleswig-Holstein
- Rudolf von, Herzog ..... VII/2/1 : 758–761, 765

Z

Zwingl, Haldrich ..... IX : 479, 692

The `.idx` file of the above example looks like

```
\indexentry{Karl!V., Kaiser}{VI/2-1210}
\indexentry{Braunschweig-Wolfenbüttel!Karl Viktor von, Herzog}{VI/1-83}
\indexentry{Schleswig-Holstein!Rudolf von, Herzog}{VII/2/1-758}
\indexentry{Schleswig-Holstein!Rudolf von, Herzog}{VII/2/1-759}
[...]
```

The config file `xindex-dtk.lua` defines a special page output:

The following example runs `xindex -c dtk -l de -n <input>` and the `.idx` file looks like

```
\usepackage{url}
\DeclareUrlCommand\Email{%
  \def\UrlLeft{}%
  \def\UrlRight{}%
  \def\UrlLinkPrefix{mailto:}%
  \def\UrlType{email}%
}
\usepackage{multicol}
\makeatletter
\def\DTK@scan@item#1\subitem#2\relax#3\@nil{%
  \def\DTK@tempa{#1}\def\DTK@tempb{#2}\def\DTK@tempc{#3}%
}
\def\theindex{%    only for demonstration
  \columnseprule=\z@ \columnsep=10\p@
  \begin{multicols}{2}[\noindent\textbf{\large Autorenliste}]%
    \makeatletter
    \def\indexspace{}%
    \parindent\z@
```

```
    \setlength{\parskip}{\z@ \@plus .3\p@}%
    \setlength{\parfillskip}{\z@ \@plus 1fil}%
    \raggedright
    \def\item##1\@nil{\DTK@scan@item##1\@nil
      \par\parbox{\columnwidth}{%
        \textbf{\DTK@tempa}\hfill[\DTK@tempc]\par\DTK@tempb
      }%
      \par\bigskip
    }%
}
\def\endtheindex{\end{multicols}}
\makeatother
\usepackage{makeidx}
```

xindex-19.tex

```
\mbox{}\label{president}
\printindex
```

Autorenliste

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There are three predefined sublabels for `\subitems`. The program itself can handle more, there is no limit for `xindex`.

```
\makeatletter
\g@addto@macro{\theindex}{%
  \def\subsubsubitem{\@idxitem\hspace*{35\p@}}
  \def\subsubsubsubitem{\@idxitem\hspace*{40\p@}}
}
\makeatother
\usepackage{makeidx}\makeindex
```

```
foo\index{foo} bar\index{foo!bar}
baz\index{foo!bar!baz} foobar%
\index{foo!bar!baz!foobar} Kuba
\index{foo!bar!baz!foobar!Kuba}
\newpage \printindex
```

xindex-20.tex

Index

F
foo
- bar
  – baz
    — foobar
      —Kuba, 1

foo, 1

6. hyperref

Using the package hyperref is no problem:

xindex-21.tex

```
\usepackage{makeidx}\makeindex
\usepackage{hvindex}% for \Index
\usepackage[colorlinks]{hyperref}
```

```
Sorted with \verb|-l DE| \par
\Index{Österreich} \Index{Öresund} \Index{Ostern}
\Index{Ober} \Index{Oberin} \Index{Österreich}
\index{Öresund|textbf} \Index{Ostern} \Index{Ober}
\Index{Oberin} \Index{Obstler} \Index{Öl} \Index{ölen}
\Index{Ödem} \Index{Oligarch} \Index{Oder} \Index{oder}
\index{Fluss!Oder|textit} \Index{Oder|seealso{Fluss}}
\Index{Göbel} \Index{Goethe} \Index{Göthe} \Index{Götz}
\newpage\Index{Goldmann} \Index{Goethe} \newpage \printindex
```

Index

The following example fixes a problem with hyperref and escaping the | character, e.g."|. In such a case hyperref ignores the vertical bar. With the optional parameter -f | --fix_hyperref, which is still experimental, xindex tries to fix this problem. However, instead of using this problematic vertical character, you can use \textbar, which also solves the problem.

xindex-22.tex

```
\usepackage[noautomatic]{imakeidx}
\usepackage{hvindex}
\makeindex[columns=5, columnsep=6pt, options=--fix_hyperref]
\usepackage{hyperref}
```

```
Symbols:\\
! \index{"!} " \index{""} \# \index{#@\#} \$ \index{$@\$}
\% \index{%@\%} \& \index{&@\&} ' \index{'} ) \index{)}
( \index{(} * \index{*} + \index{+} , \index{,@,\,}
- \index{-} . \index{.} / \index{/} : \index{:}
; \index{;} < \index{<} = \index{=} > \index{>}
? \index{?} @ \index{"@} [ \index{[} ] \index{]}
\_ \index{_@\_} ` \index{`} | \index{\textbar}
\newpage\index{"|}\index{\textbar}\index{123}\Index{Post}
\{ \index{\braceLeft} \} \index{\braceRight}
\textbackslash \index{\@\textbackslash}
\textasciicircum \index{^@\textasciicircum}
\textasciitilde \index{~@\textasciitilde}

Alphabet: \Index{Z},\Index{Zeppelin}\Index{Foo}\dots
\Index{...@\ldots}
\printindex
```

Index

7. Including commands into the .idx file

The command \addtocontents doesn't work for the index file. With the LaTeX package xindex (same name as the Lua program xindex) defines a macro \writeidx which writes its argument into the .idx file. This can be useful to insert a pagebreak/columnbreak before a new letter in the output of the index file:

```
\documentclass{article}
\usepackage{makeidx}
\makeindex
\usepackage{xindex}
\begin{document}

\index{foo}foo and
\writeidx{\clearpage}
\index{bar}bar

\printindex
\end{document}
```

Such commands are then taken into account by the program xindex. With the often used program makeindex such commands are ignored. In the following example we put an horizontal line after the first entry:

xindex-23.tex

```
\usepackage{xindex}
\makeindex
```

```
\index{foo}foo and
\writeidx{\item\protect\hrulefill}
\index{bar}bar
\index{gex}gex
\printindex
```

Index

B
bar, 1

F
foo, 1

G
gex, 1

8. Headings

By default the output uses the English headings: *Symbols*, *Numbers*, and *A* ...There are three predefined languages `en`, `de`, and `fr`. The definition is in the file `xindex-cfg-common.lua` (see also section 2 on page 5). It can easily be extended for other languages. Sometimes the headers are not needed, for example in a name list. With the optional argument `-n` or `--noheadings` the created `.ind` file has only the vertical space between different first letters:

xindex-24.tex

```
\usepackage{makeidx}\makeindex
```

```
Ein foo\index{foo}\index{bar|(}
 \newpage und \index{foo}
ein foo\index{foo|textit} \newpage
und foo\index{foo|textbf} \newpage
und foo\index{foo|fbox}
\index{bar|)}
\newpage
\verb|xindex -n <file>|
\printindex
```

```
xindex -n <file>
```

Index

bar, 1–4

foo, 1, *2*, 2, **3**, 4

The headings are printed by default as `\textbf`. This can be changed in the config file by setting the variable `idxnewletter`, for example: `idxnewletter = "\\textit"`. If you need some more code here then define an own macro for it, which can be seen in the following example. It has an own config file `xindex-header.lua` which has the line

```
idxnewletter = "\\idxnewletter"
```

In the documents preamble there is the definition:

```
\newcommand\idxnewletter[1]{\textbf{\textit{#1}}}
```

```
\usepackage{makeidx}\makeindex
\newcommand\idxnewletter[1]{\textbf{\textit{#1}}}
```

```
\section{Escaping characters}
\begin{itemize}
\item Exclamation mark ! \index{exclaim ("!)}
\item Vertical bar| \index{Vertical bar ("|)}
\item Doublequote \verb|"| \index{""}
\item Double doublequote \verb|""| \index{""""}
\item At character @ \index{At ("@)}
\end{itemize}
run \verb|xindex -c header <file.idx>|
\index{<file.idx>@\texttt{<file.idx>}}

\index{123}
\newpage \printindex
```

Index

xindex-25.tex

9. Automatic index creation

With package xindex one can define several different index files, e.g. an index of names. With the optional argument imakeidx the package itself loads imakeidx and adds the program xindex as the default program to imakeidx.

xindex-26.tex

```
\usepackage[imakeidx]{xindex}
\makeindex[name=persons,title=Index of names,
  columns=1,options= --noheadings]
\def\ThanhVN{Hàn Thê\protect\llap{%
  \raise 0.5ex\hbox{\'{}}}}

foo\index[persons]{Niepraschk,~ Rolf}
foo\index[persons]{Lamport,~ Leslie}
foo\index[persons]{Knuth,~ Donald}
foo\index[persons]{Knuth,~ Donald}
\newpage
foo\index[persons]{Lamport,~ Leslie}
foo\index[persons]{Thành,~ \ThanhVN}
foo\index[persons]{Kew,~ Jonathan}
foo\index[persons]{Kohm,~ Markus}
foo\index[persons]{Preining,~ Norbert}
\newpage
foo\index[persons]{Schenk,~ Christian}
foo\index[persons]{Feuerstack,~ Thomas}
foo\index[persons]{Tobin,~ Geoffrey}
foo\index[persons]{Wilson,~ Peter}
\newpage
foo\index[persons]{Kohm,~ Markus}
foo\index[persons]{Theiling,~ Henrik}
foo\index[persons]{Pégourié-Gonnard,~ Manuel}
foo\index[persons]{Roux,~ Élie}
\newpage
foo\index[persons]{Mittelbach,~ Frank}
foo\index[persons]{Fairbairns,~ Robin}
foo\index[persons]{Lemberg,~ Werner}
foo\index[persons]{Volovich,~ Vladimir}

\printindex[persons]
```

Index of names

Fairbairns, Robin,
Feuerstack, Thomas,

Kew, Jonathan,
Knuth, Donald,
Kohm, Markus,

Lamport, Leslie,
Lemberg, Werner,

Mittelbach, Frank,

Niepraschk, Rolf,

Pégourié-Gonnard, Manuel,
Preining, Norbert,

Roux, Élie,

Schenk, Christian,

Thành, Hàn Thế,
Theiling, Henrik,
Tobin, Geoffrey,

Volovich, Vladimir,

Wilson, Peter,

You have to run LaTeX with the `--shell-escape` option to run `xindex` from within the LaTeX document.

10. Labels

By default `xindex` creates labels in the index for the symbols, numbers, and other parts (letters) to which one can refer. with `\ref{label}`. The labels are named `L-xindex-<name>`. The prefix `L` can be changed by the config file. `<name>` may be `symbols`, `numbers`, or `A` (a letter). For example

```
\begin{theindex}
\par\textbf{Symbols}\label{L-xindex-symbols}
\nopagebreak[4]
  \item  @, \hyperpage{3}
  \item  (, \hyperpage{3}
  \item  !, \hyperpage{3}

\indexspace
\textbf{A}\label{L-xindex-A}
[...]
```

The labels can be used to create a reference to a specific part in the index, for example the letter X is in the index on page 25 (`\pageref{L-xindex-X}`).

With the optional argument `-b` for the run of `xindex` one can suppress the creation of the labels, e.g. `xindex -b -l fr ...`

11. Demerits

- For more than 5000 entries in the `.idx` file the internal Lua function for sorting may take some time.
- The `.idx` file is not checked for LaTeX errors in the argument of `\indexentry`.

A. Examples

Correct french sorting with UCA:

```
%%% xindex -l fr <file>
\IND{CÔTÉ} \IND{cote} \IND{Côté} \IND{COTÉ} \IND{côte}
\IND{COTE} \IND{côté} \IND{Coté} \IND{coté} \IND{Cote}
\IND{CÔTE} \IND{Côte} \IND{lésé} \IND{péché}
\IND{bohème} \IND{gêné} \IND{pêche} \IND{cæsium}
\IND{pêcher} \IND{révèle} \IND{pécher} \IND{révélé}
\IND{Bohême} \IND{relève} \IND{PÉCHÉ} \IND{maçon}
\IND{relevé} \IND{Élève} \IND{gêne} \IND{élevé}
\IND{MÂCON} \IND{gène} \IND{Bohémien} \IND{caennais}
\IND{lèse} \IND{coexistence} \IND{œcur}
\IND{coefficient} \IND{cafard} \IND{ŒCUR} \IND{CÆSIUM}
\newpage \IND{coté} \IND{œcur} \IND{péché} \newpage
\IND{coté}\IND{coefficient} \newpage

\pagestyle{empty} \printindex
```

xindex-27.tex

Index

B
bohème, 1
Bohême, 1
Bohémien, 1

C
caennais, 1
cæsium, 1
CÆSIUM, 1
cafard, 1
coefficient, 1, 3
CŒUR, 1
coexistence, 1
cote, 1
Cote, 1
COTE, 1
côte, 1
Côte, 1
CÔTE, 1
coté, 1
Coté, 1
COTÉ, 1
côté, 1
Côté, 1
CÔTÉ, 1
coté, 2 sq.
cœur, 1 sq.

E
Élève, 1
élevé, 1

G
gène, 1
gêne, 1
gêné, 1

L
lèse, 1
lésé, 1

M
MÂCON, 1
maçon, 1

P
pêche, 1
péché, 1
PÉCHÉ, 1
péché, 2
pécher, 1
pêcher, 1

R
relève, 1
relevé, 1
révèle, 1
révélé, 1

```
\usepackage{makeidx} \makeindex
% Brian Dunn
```

```
First level.\index{first level}

First level second level.\index{first level!second level}

Duplicate.\index{first level!second level}

Alpha.\index{alpha}

Alpha beta.\index{alpha!beta}

Alpha beta gamma.\index{alpha!beta!gamma}

Duplicate alpha beta.\index{alpha!beta}

Duplicate alpha beta gamma.\index{alpha!beta!gamma}

\newpage
\printindex
```

xindex-28.tex

Index

A
alpha
- beta
– gamma, 1

alpha, 1

F
first level
- second level, 1

first level, 1

xindex-29.tex

```
\usepackage{makeidx}\makeindex
```

```
Test \index{A!Test} oder auch \index{B!Test}
\newpage
\printindex
```

Index

A
A
- Test, 1

B
B
- Test, 1

xindex-30.tex

```
%% Denis Bitouzé
\usepackage{makeidx}\makeindex
```

```
Foo\index{foo!bar1!baz1}
Foo\index{foo!bar1!baz2}
Foo\index{foo!bar2!baz1}
Foo\index{foo!bar2!baz2}
\printindex
```

Index

F
foo
- bar1
  - baz1, 1
  - baz2, 1
- bar2
  - baz1, 1
  - baz2, 1

Index