Program and package xindex

–

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Contents

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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 long7 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
[-x,--no_UCA ]                       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 \barceLeft|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 paranthesis \{ \index{\braceLeft}
\item Right paranthesis \}  \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 paranthesis {
- Right paranthesis }

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).

The same example without using unicode sorting (option `-x`):

xindex-2.tex

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

```
\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 paranthesis \{ \index{\braceLeft}
\item Right paranthesis \}  \index{\braceRight}
\end{itemize}
```

```
run \texttt{xindex -x <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 paranthesis {
- Right paranthesis }

run `xindex -x <file.idx>`

Index

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-3.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",
  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"},
}
```

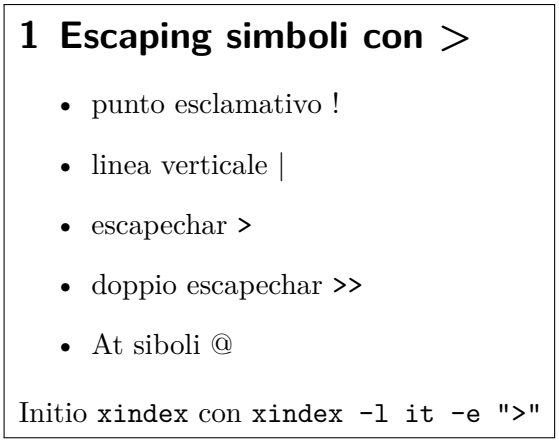
The following example was run with `xindex -l it <file>.idx`:

xindex-4.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}
```

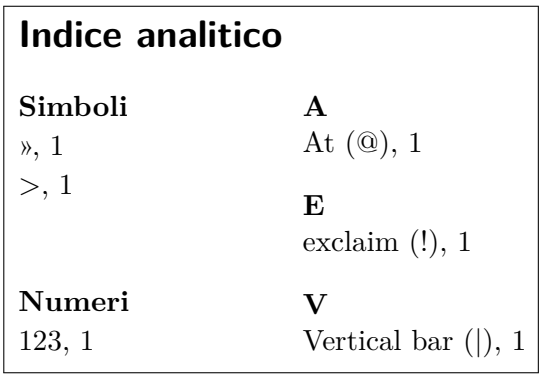
```
Initio \texttt{xindex} con \texttt{xindex -l it -e ">"}\index{123}
\twocolumn \printindex
```



1 Escaping simboli con >

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

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



Indice analitico

Simboli
», 1
>, 1

Numeri
123, 1

A
At (@), 1

E
exclaim (!), 1

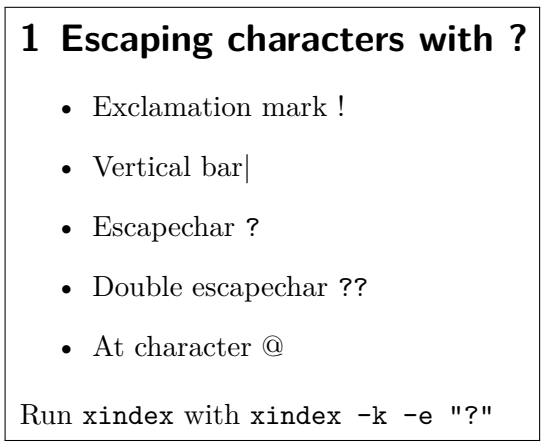
V
Vertical bar (|), 1

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-5.tex

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

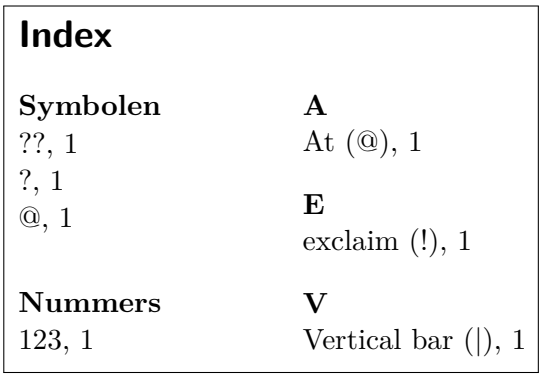
```
\section{Escaping characters with ?}
\begin{itemize}
\item Exclamation mark ! \index{exclaim (?!)}
\item Vertical bar| \index{Vertical bar (?|)}
\item Escapechar \verb|?| \index{??}
\item Double escapechar \verb|??| \index{????}
\item At character @ \index{At (?@)}\index{?@}
\end{itemize}
Run \texttt{xindex}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

Symbolen
??, 1
?, 1
@, 1

Nummers
123, 1

A
At (@), 1

E
exclaim (!), 1

V
Vertical bar (|), 1

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

```
\usepackage[russian]{babel}
\usepackage{fontspec}
```

xindex-6.tex

```
\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. Sorting

3.1. 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`.

If possible, you should use the Unicode sorting by default and only for some special cases where you define your own sorting scheme, you should use the `-x` option.

xindex-7.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`.

3.2. Default sorting by a character table

This sorting is not completely unicode aware. It uses a translation table for accented characters, which should only be used if the standard sorting method with UCA is not possible! This kind of sortierung has to be choosed by the option `-x` (don't use UCA). The option `-u` for using UCA is deprecated, because using UCA is the default.

Again, if on wants to use an own transformation table, then use something like:

```
alphabet_lower = { --   for sorting
    { ' ' },  -- only for internal tests
    { 'a', 'á', 'à', 'ä'},
    { 'b' },
    { 'c' },
    { 'd' },
    { 'e', 'é', 'è', 'ë' },
    { 'f' },
    { 'g' },
    { 'h' },
    { 'i', 'í', 'ì', 'ï' },
    { 'j' },
    { 'k' },
    { 'l' },
    { 'm' },
    { 'n', 'ñ' },
    { 'o', 'ó', 'ò', 'ö' },
    { 'p' },
    { 'q' },
    { 'r' },
    { 's' },
    { 't' },
    { 'u', 'ú', 'ù', 'ü' },
    { 'v' },
    { 'w' },
    { 'x' },
    { 'y' },
    { 'z' }
```

```
}
```

There is also a table for the uppercase letters. If it should be edited or extended then copy first the base configuration file `xindex-cfg.lua` and modify that new file. It can be used by `xindex` with the optional argument `-c newfile` if it is named as `xindex-newfile.lua`. For German there already exists a configuration file `xindex-DIN2.lua` which uses the so-called »Telefonbuchsortierung« which converts the umlauts like öoe:

```
alphabet_upper = { -- for sorting
    { ' ' },
    { 'A', 'Á', 'À', 'Ä'},
    { 'B' },
    { 'C' },
    { 'D' },
    { 'E', 'È', 'È', 'ë' },
    { 'F' },
    { 'G' },
    { 'H' },
    { 'I', 'Í', 'Ì', 'ï' },
    { 'J' },
    { 'K' },
    { 'L' },
    { 'M' },
    { 'N', 'Ñ' },
    { 'O', 'Ó', 'Ò', 'Ö' },
    { 'P' },
    { 'Q' },
    { 'R' },
    { 'S' },
    { 'T' },
    { 'U', 'Ú', 'Ù', 'Ü' },
    { 'V' },
    { 'W' },
    { 'X' },
    { 'Y' },
    { 'Z' }
}
```

3.3. Examples

3.3.1. German language and no UCA

```
\usepackage{makeidx}\makeindex
\newcommand\Index[1]{\index{#1}#1}
Sorted with \verb|-l DE -x|\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
```

xindex-8.tex

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
Oder, 1, *siehe auch* Fluss
Öl, 1
ölen, 1
Oligarch, 1
Öresund, 1
Ostern, 1
Österreich, 1

3.3.2. German language (DIN2) and no UCA

In this case a letter Ö, Ä, Ü, ö, ä, ü is converted to Oe, Ae, Ue, oe, ae, ue before sorting:

```
\usepackage{makeidx}\makeindex
\newcommand\Index[1]{\index{#1}#1}
Sorted with
\verb|--config DIN2 -l DE -x|

\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
```

xindex-9.tex

Index

F
Fluss
    - Oder, 1

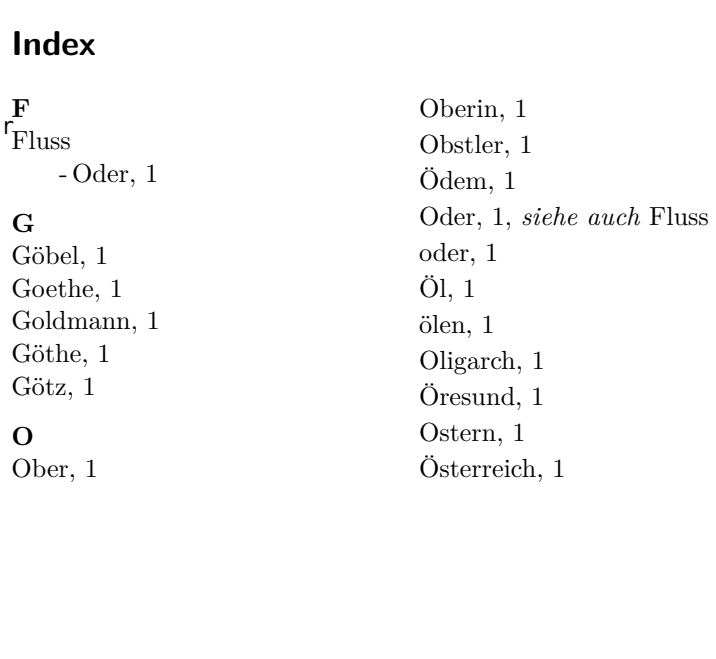
G
Göbel, 1
Goethe, 1
Goldmann, 1
Göthe, 1
Götz, 1

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

3.3.3. German language with UCA

xindex-10.tex

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

Sorted with \verb|-l DE| and using UCA\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

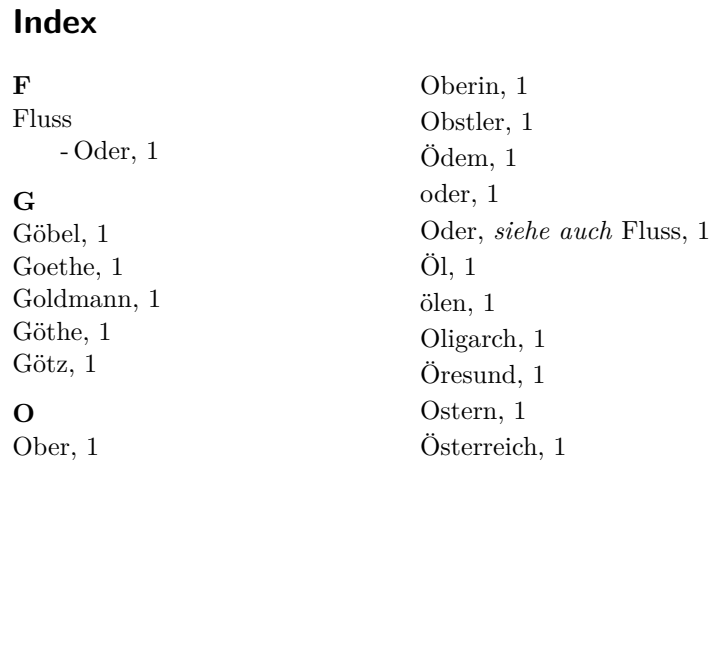
O
Ober, 1
Oberin, 1
Obstler, 1
Ödem, 1
Oder, 1, *siehe auch* Fluss
oder, 1
Öl, 1
ölen, 1
Oligarch, 1
Öresund, 1
Ostern, 1
Österreich, 1

3.3.4. German language (DIN2) with UCA

The same sorted with the German DIN variant 2. It uses also the config file with `--config DIN2`, but sets the language internally to `de_din2` for UCA and do not use the character tables:

xindex-11.tex

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

Sorted with
\verb|--config DIN2 -l DE|

\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
Oder, *siehe auch* Fluss, 1
Öl, 1
ölen, 1
Oligarch, 1
Öresund, 1
Ostern, 1
Österreich, 1

3.3.5. Japanese language with UCA

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

```
\usepackage{fontspec}
\setmainfont{SourceHanSans}
\usepackage[japanese]{babel}
\addto\captionsjapanese{\def\indexname{指数}}
\usepackage{hvindex}% for \Index
\usepackage{makeidx}\makeindex
```

```
\Index{車} \Index{車道} 日本\index{日本|fbox}  \Index{病院} \Index{コンピュータ}
\Index{プリンタ} \Index{印刷}  \Index{スイミングプール} \Index{天王} \Index{広島}
\Index{ドイツ} \Index{日本} \Index{ワープロ}
\Index{foo} und \Index{bar} \Index{//} \Index{4711}   \newpage\printindex
```

指数

3.4. 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.

xindex-13.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

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-14.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

3.5. Ignore space for sorting

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

xindex-15.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`:

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

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

\printindex
```

xindex-16.tex

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`:

```
\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-17.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.

xindex-18.tex

```
\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
```

Index

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

4.3. Supress Pagenumber

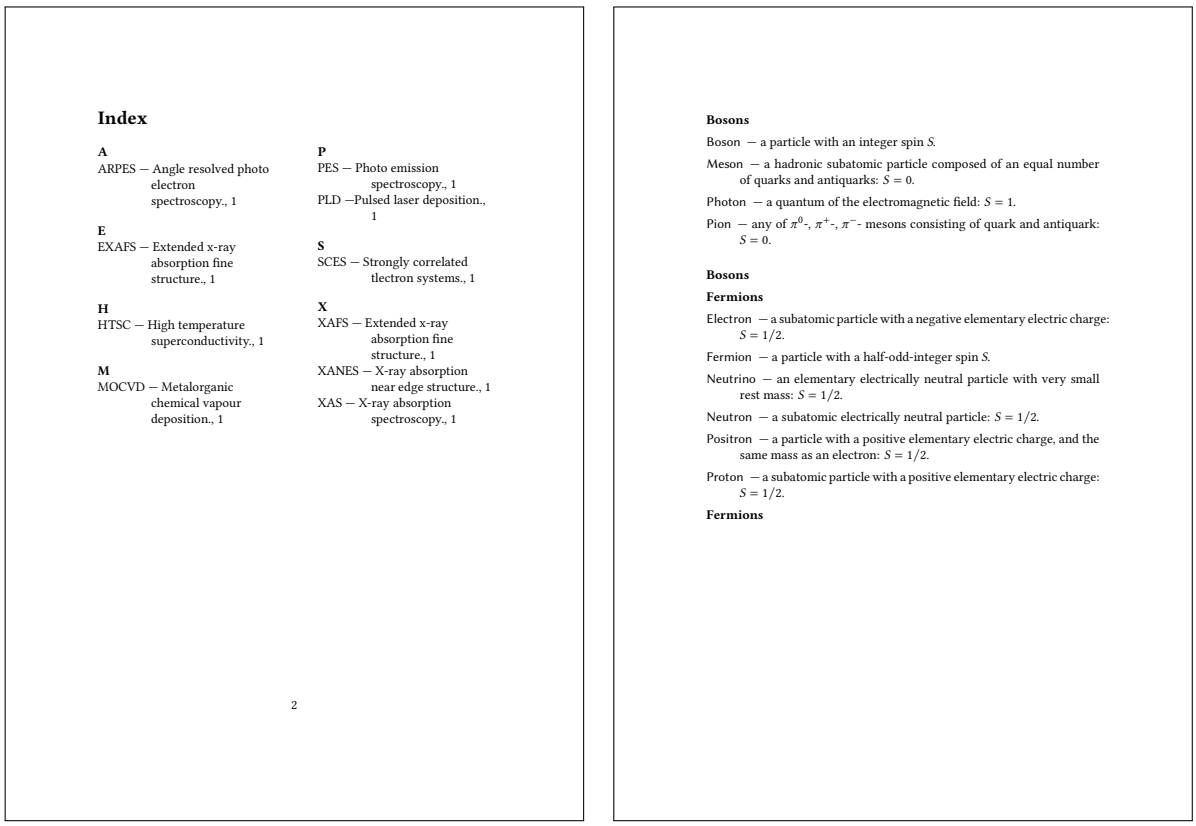
Instead of printing an index in the default way, one can also print a glossary without the pagenumbers. This is possible with the optional argument `-g` which is equivalent to the long form `--no_pagenumber`. The following example uses an own config file for the definition of the `description` environment:

```
itemPageDelimiter = ""
compressPages     = true
fCompress         = false
minCompress       = 2
rangeSymbol       = "--"
numericPage       = true
sublabels         = {"", "\\item", "\\item", "\\item"}
pageNoPrefixDel   = ""
idxnewletter      = "\\textbf"
envStart          = "\\begin{description}"
indexOpening      = "\\makeatletter\z
                     \\def\\subitem{\\@idxitem} \\def\\subsubitem{\\@idxitem}\z
                     \\def\\subsubsubitem{\\@idxitem}\z
                     \\makeatother\z
                     \\itemsep 0.1ex" -- commands after envStart
envStop           = "\\end{description}"
```

xindex-19.tex

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

```
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

```
itemPageDelimiter = ","     -- Hello, 14
compressPages     = true
  -- something like 12--15, instead of 12,13,14,15. the |( ... |) syntax is still valid
fCompress   = true    -- 3f -> page 3, 4 and 3ff -> page 3, 4, 5
minCompress       = 3       -- 14--17
rangeSymbol       = "--"
numericPage       = true    -- for non numerical pagenumbers, like "VI-17"
sublabels         = {"", "-\\-", "--\\-", "---\\-"}
   -- for the sub(sub(sub-items, first one is empty
pageNoPrefixDel   = ""     -- a delimiter for page numbers like "VI-17"  -- not used !!!
indexOpening      = ""     -- commands/text after \begin{theindex}
```

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

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:

```
function specialCompressPageList(pages)
  if (pages[1]["number"] == "") then pages[1]["number"] = " " end
  if (#pages <= 1) then
    pages[1]["number"] = pages[1]["number"]:gsub('-',':~')-- replace "-" with ":~"
    return pages
  end  -- only one pageno
  local sortPages = {}
  local roman
  local volume
  local page
  local i
  for i=1,#pages do
     roman = string.gsub(pages[i]["number"],'%U*','') -- only uppercase to catch VII/1-123f and VII/3-
123ff (folium pages)
     if romanToNumber(roman) then
       roman = string.format("%05d",tonumber(romanToNumber(roman))) -- only roman part VII
     else
       roman = ""
     end
     volume = string.gsub(pages[i]["number"],'%a*','') -- only the number /2 123 or /2-123
     if volume then volume = volume:gsub('-%d*','') end -- delete - char to get /2
     page = string.gsub(pages[i]["number"],'.*-','')
     page = string.format("%5s",page)
     sortPages[#sortPages+1] = {
       origin = pages[i],
       sort = roman..volume.." "..page }  -- no minus between Roman/Volume and first page
   end
  table.sort(sortPages, function(a,b) return a["sort"] < b["sort"] end )

[...]

    return pages
  end
end
```

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.

xindex-20.tex

```
\usepackage{makeidx}
```

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

Personenverzeichnis

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:

```
function specialGetPageList(v,hyperpage)  -- Entry table, boolean
  local Pages = {}
[..]
      if (Pages[1]["special"] == nil) or (Pages[1]["number"] == nil) then return ""  end
      if #Pages == 1 then
        return "\\relax"..Pages[1]["number"].."\\@nil"
      else
        pageNo = "\\relax"..Pages[1]["number"]
        for i=2,#Pages do
          if Pages[i]["number"] then
            pageNo = pageNo..", "..Pages[i]["number"].."\\@nil"
            Pages[i] = {}
          end
        end
```

```
[..]
end
```

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

```
\indexentry{BährendtsenElke@Elke Bährendtsen!\Email {elke"@xyz.de}}{14}
\indexentry{JacekJonasson Jared@Jonasson Jared Jazek!\Email {mail"@jones.net}}{20}
[...]
```

xindex-21.tex

```
\usepackage{makeidx}
```

```
\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-22.tex

Index

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

foo, 1

6. hyperref

Using the package hyperref is no problem:

xindex-23.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-24.tex

```
\usepackage[imakeidx]{xindex}
\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 LaTeX 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-25.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 7). 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-26.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}}}
```

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

```
œšžŒŠŸŽ
\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-27.tex

Symbols
””, 1
”, 1
<file.idx>, 1

Numbers
123, 1

A
At (@), 1

E
exclaim (!), 1

V
Vertical bar (|), 1

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-28.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>` maybe `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 33 (`\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-29.tex

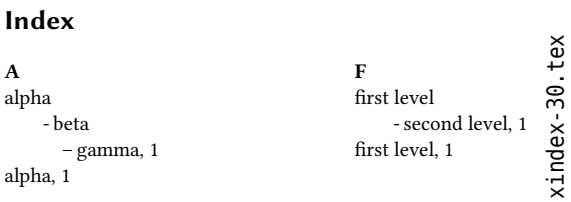
```
\usepackage[french]{babel}
\usepackage[imakeidx]{xindex} \makeindex
\newcommand*{\IND}[1]{\index{#1}#1\par}
```

```
%%% 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} \printindex
```

Index

```
\usepackage[imakeidx]{xindex}
\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
```



Index

A
alpha
- beta
– gamma, 1

alpha, 1

F
first level
- second level, 1

first level, 1

xindex-30.tex

```
\usepackage[imakeidx]{xindex}
\makeindex[options=-l de]
% Martin Sievers
```

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

Index

A
A
- Test, 1

B
B
- Test, 1

xindex-31.tex

xindex-32.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