

The biblatex package

Programmable bibliographies and citations

Philipp Lehman
plehman@gmx.net

Version 0.8e
July 4, 2009

Contents

1	Introduction	1	3.6	Citation commands . . .	64	
	1.1	About	1	3.7	Localization commands	72
	1.2	License	2	3.8	Formatting commands .	73
	1.3	Feedback	2	3.9	Language notes	80
	1.4	Acknowledgments	2	3.10	Usage notes	81
	1.5	Contributions	3	3.11	Hints and caveats	90
	1.6	Prerequisites	3	4	Author guide	94
2	Database guide	6	4.1	Overview	94	
	2.1	Entry types	6	4.2	Bibliography styles	97
	2.2	Entry fields	12	4.3	Citation styles	105
	2.3	Usage notes	27	4.4	Data interface	107
	2.4	Hints and caveats	32	4.5	Auxiliary commands . . .	114
3	User guide	38	4.6	Punctuation and spacing	128	
	3.1	Package options	38	4.7	Bibliography strings . . .	134
	3.2	Global customization . . .	49	4.8	Localization modules . . .	135
	3.3	Standard styles	50	4.9	Formatting commands . . .	146
	3.4	Sorting options	55	4.10	Hints and caveats	154
	3.5	Bibliography commands	57	5	Revision history	165

1 Introduction

Please be advised that this package is in beta stage and released for testing. The version number will be stepped up to 1.0 as soon as it is considered suitable for general distribution. TeX distributors are advised to wait for version 1.0.

This document is a systematic reference manual for the biblatex package. Look at the sample documents which ship with this package to get a first impression.¹ For a quick start guide, browse sections 1.1, 2.1, 2.2, 2.3, 3.1, 3.3, 3.5, 3.6, 3.10.

1.1 About

This package provides advanced bibliographic facilities for use with LaTeX in conjunction with BibTeX. The package is a complete reimplementaion of the bibliographic facilities provided by LaTeX. It redesigns the way in which LaTeX interacts with BibTeX at a fairly fundamental level. With biblatex, BibTeX is only used to sort the bibliography and to generate labels. Instead of being implemented in bst files, the formatting of the bibliography is entirely controlled by LaTeX macros, hence the name biblatex. Good working knowledge in LaTeX should be sufficient

¹ <http://www.ctan.org/tex-archive/macros/latex/expt1/biblatex/doc/examples/>

to design new bibliography and citation styles. There is no need to learn BibTeX's postfix stack language. This package also supports subdivided bibliographies, multiple bibliographies within one document, and separate lists of bibliographic short-hands. Bibliographies may be subdivided into parts and/or segmented by topics. Just like the bibliography styles, all citation commands may be freely defined. The package is completely localized and can interface with the babel package. Please refer to table 1 on page 23 for a list of languages currently supported by this package.

1.2 License

Copyright © 2006–2009 Philipp Lehman. Permission is granted to copy, distribute and/or modify this software under the terms of the LaTeX Project Public License, version 1.3.¹ This package is author-maintained.

1.3 Feedback

Please use the biblatex project page on SourceForge to report bugs and submit feature requests.² There are two trackers on this page: Bugs for bug reports and Features for feature requests.³ Select a tracker, then click on 'Add new' to submit your report or request. I may consider implementing a new feature if the request is reasonable, seems to be relevant to a considerable number of users, and complies with the architecture and philosophy of biblatex. Before making a feature request, please ensure that you have thoroughly studied this manual. If you do not want to report a bug or request a feature but are simply in need of assistance, you might want to consider posting your question on the comp.text.tex newsgroup. I can not provide end-user support by email or via the project page.

1.4 Acknowledgments

A package like biblatex naturally draws upon previous solutions in some way or other. There are a few packages and other resources which have been particular inspiring or helpful. The amsrefs package by Michael Downes uses TeX rather than BibTeX to format the bibliography. This has originally inspired the idea of using a structured data interface with BibTeX. Code snippets drawn from the custom-bib package by Patrick W. Daly have been helpful while learning BibTeX's rather special stack language. The IEEEtran.bst file by Michael Shell introduces a special control entry type to pass control parameters to BibTeX at run-time. This package enhances this inventive idea such that all parameters are conveniently settable via package options. While this package has been written entirely from scratch, I have studied the features of popular packages such as cite, natbib, and jurabib, as well as related ones like chapterbib, bibtopic, and bibunits, to get an idea of what kind of features users might expect from a full-featured bibliographic package. Some of biblatex's features were heavily inspired by these packages or are explicitly modelled after previous solutions.

¹ <http://www.ctan.org/tex-archive/macros/latex/base/lppl.txt>

² <http://sourceforge.net/projects/biblatex/>

³ http://sourceforge.net/tracker2/?group_id=244752

1.5 Contributions

The language modules of this package include contributions by (in the order of submission): Ignacio Fernández Galván (Spanish/Spain), Enrico Gregorio (Italian), Johannes Wilm (Danish and Norwegian), Per Starbäck, Carl-Gustav Werner, Filip Åsblom (Swedish), Augusto Ritter Stoffel (Portuguese/Brazil).

1.6 Prerequisites

This section gives an overview of all resources required by this package and discusses compatibility issues.

1.6.1 Requirements

The resources listed in this section are strictly required for `biblatex` to function. The package will not work if they are not available.

- e-TeX** The `biblatex` package requires e-TeX. TeX distributions have been shipping e-TeX binaries for quite some time, the popular distributions use them by default these days. The `biblatex` package checks if it is running under e-TeX. Simply try compiling your documents as you usually do, the chances are that it just works. If you get an error message, try compiling the document with `elatex` instead of `latex` or `pdfelatex` instead of `pdflatex`, respectively.
- BibTeX** By default, the `biblatex` package uses BibTeX as a database backend. While a legacy BibTeX binary is sufficient to run `biblatex`, using `bibtex8` is recommended. If your TeX distribution does not ship with `bibtex8`, you can get it from CTAN.¹
- Biber** Biber is the next-generation backend of `biblatex`. It is currently under development but may already be used instead of BibTeX. You only need one backend, either BibTeX or Biber. Biber is available from SourceForge.²
- etoolbox** This LaTeX package, which is loaded automatically, provides generic programming facilities required by `biblatex`. It is readily available from CTAN.³

Apart from the above resources, `biblatex` also requires the standard LaTeX packages `keyval` and `ifthen` as well as the `url` package. These package are included in all common TeX distributions and will be loaded automatically. If the `bibencoding` package option is enabled, the `inputenc` package is required in addition to that. Note that `inputenc` is not loaded automatically.

1.6.2 Recommended packages

The packages listed in this section are not required for `biblatex` to function, but they provide recommended additional functions or enhance existing features. The package loading order does not matter.

- babel** The `babel` package provides the core architecture for multilingual typesetting. If you are writing in a language other than American English, using this package is

¹ <http://www.ctan.org/tex-archive/biblio/bibtex/8-bit/>

² <http://biblatex-biber.sourceforge.net/>

³ <http://www.ctan.org/tex-archive/macros/latex/contrib/etoolbox/>

strongly recommended. If loaded, `biblatex` package will detect `babel` automatically.

`csquotes` If this package is available, `biblatex` will use its language-sensitive quotation facilities to enclose certain titles in quotation marks. If not, `biblatex` uses quotes suitable for American English as a fallback. When writing in any other language, loading `csquotes` is strongly recommended.¹

1.6.3 Compatible classes and packages

The `biblatex` package provides dedicated compatibility code for the classes and packages listed in this section.

`hyperref` The `hyperref` package transforms citations into hyperlinks. See the `hyperref` and `backref` package options in section 3.1.2 for further details. When using the `hyperref` package, it is preferable to load it after `biblatex`.

`showkeys` The `showkeys` package prints the internal keys of, among other things, citations in the text and items in the bibliography. The package loading order does not matter.

`memoir` When using the `memoir` class, the default bibliography headings are adapted such that they blend well with the default layout of this class. See section 3.II.2 for further usage hints.

KOMA-Script When using any of the `scrartcl`, `scrbook`, or `scrreprt` classes, the default bibliography headings are adapted such that they blend with the default layout of these classes. See section 3.II.1 for further usage hints.

1.6.4 Incompatible packages

The packages listed in this section are not compatible with `biblatex`. Since it reimplements the bibliographic facilities of LaTeX from the ground up, `biblatex` naturally conflicts with all packages modifying the same facilities. This is not specific to `biblatex`. Some of the packages listed below are also incompatible with each other for the same reason.

`babelbib` The `babelbib` package provides support for multilingual bibliographies. This is a standard feature of `biblatex`. Use the `hyphenation` field and the package option `babel` for similar functionality. Note that `biblatex` automatically adjusts to the main document language if `babel` is loaded. You only need the above mentioned features if you want to switch languages on a per-entry basis within the bibliography. See sections 2.2.3 and 3.1.2 for details. Also see section 3.7.

`backref` The `backref` package creates back references in the bibliography. See the package options `hyperref` and `backref` in section 3.1.2 for comparable functionality.

`bibtopic` The `bibtopic` package provides support for bibliographies subdivided by topic, type, or other criteria. For bibliographies subdivided by topic, see the `category` feature in section 3.5.5 and the corresponding filters in section 3.5.1. Alternatively, you may use the `keywords` field in conjunction with the `keyword` and `notkeyword`

¹ <http://www.ctan.org/tex-archive/macros/latex/contrib/csquotes/>

filters for comparable functionality, see sections 2.2.3 and 3.5.1 for details. For bibliographies subdivided by type, use the `type` and `notype` filters. Also see section 3.10.4 for examples.

- bibunits** The `bibunits` package provides support for multiple partial (e. g., per chapter) bibliographies. See `chapterbib`.
- chapterbib** The `chapterbib` package provides support for multiple partial bibliographies. Use the `refsection` environment and the `section` filter for comparable functionality. Alternatively, you might also want to use the `refsegment` environment and the `segment` filter. See sections 3.5.3, 3.5.4, and 3.5.1 for details. Also see section 3.10.3 for examples.
- cite** The `cite` package automatically sorts numeric citations and can compress a list of consecutive numbers to a range. It also makes the punctuation used in citations configurable. For sorted and compressed numeric citations, see the `sortcites` package option in section 3.1.2 and the `numeric-comp` citation style in section 3.3.1. For configurable punctuation, see section 3.8.
- citeref** Another package for creating back references in the bibliography. See `backref`.
- inlinebib** The `inlinebib` package is designed for traditional citations given in footnotes. For comparable functionality, see the verbose citation styles in section 3.3.1.
- jurabib** Originally designed for citations in law studies and (mostly German) judicial documents, the `jurabib` package also provides features aimed at users in the humanities. In terms of the features provided, there are some similarities between `jurabib` and `biblatex` but the approaches taken by both packages are quite different. Since both `jurabib` and `biblatex` are full-featured packages, the list of similarities and differences is too long to be discussed here.
- mcite** The `mcite` package provides support for the grouping of multiple citations, i. e., multiple items can be cited as a single reference and listed as a single block in the bibliography. The citation groups are defined as the items are cited. This only works with unsorted bibliographies. The `biblatex` package also supports grouped citations, which are called ‘reference sets’ or ‘entry sets’ in this manual, but the approach is different. With `biblatex`, reference sets are defined in the `bib` file and cited just like any other entry. See the entry type `@set` in section 2.1.1 and section 3.10.5 for details.
- mciteplus** A significantly enhanced reimplementation of the `mcite` package which supports grouping in sorted bibliographies. See `mcite`.
- multibib** The `multibib` package provides support for bibliographies subdivided by topic or other criteria. See `bibtopic`.
- natbib** The `natbib` package supports numeric and author-year citation schemes, incorporating sorting and compression code found in the `cite` package. It also provides additional citation commands and several configuration options. See the numeric and author-year citation styles and their variants in section 3.3.1, the `sortcites` package option in section 3.1.2, the citation commands in section 3.6, and the fa-

cilities discussed in sections 3.5.6, 3.5.7, and 3.8 for comparable functionality. Also see section 3.6.9.

splitbib The `splitbib` package provides support for bibliographies subdivided by topic. See `bibtopic`.

2 Database guide

This part of the manual documents the BibTeX interface of this package. Note that you can not use `biblatex` in conjunction with arbitrary `bst` files because the package depends on a special BibTeX interface.

2.1 Entry types

This section gives an overview of the entry types supported by `biblatex` along with the fields supported by each type.

2.1.1 Regular types

The lists below indicate the fields supported by each entry type. Note that the mapping of fields to an entry type is ultimately at the discretion of the bibliography style. The lists below therefore serve two purposes. They indicate the fields supported by the standard styles which ship with this package and they also serve as a model for custom styles. Note that the ‘required’ fields are not strictly required in all cases, see section 2.3.2 for details. The fields marked as ‘optional’ are optional in a technical sense. Bibliographical formatting rules usually require more than just the ‘required’ fields. The standard styles will generally not perform any formal validity checks, but custom styles may do so. Generic fields like `abstract` and `annotation` or `label` and `shorthand` are not included in the lists below because they are independent of the entry type. The special fields discussed in section 2.2.3, which are also independent of the entry type, are not included in the lists either.

article An article in a journal, magazine, newspaper, or other periodical which forms a self-contained unit with its own title. The title of the periodical is given in the `journaltitle` field. If the issue has its own title in addition to the main title of the periodical, it goes in the `issuetitle` field. Note that `editor` and `translator` and similar fields refer to the title, not the `journaltitle`.

Required fields: `author`, `title`, `journaltitle`, `year`

Optional fields: `editor`, `translator`, `redactor`, `annotator`, `commentator`, `subtitle`, `titleaddon`, `journalsubtitle`, `issuetitle`, `issuesubtitle`, `language`, `origlanguage`, `series`, `volume`, `number`, `eid`, `issue`, `date`, `day`, `month`, `year`, `pages`, `version`, `note`, `issn`, `addendum`, `doi`, `eprint`, `eprinttype`, `url`, `urldate`, `urlday`, `urlmonth`, `urlyear`

book A book with one or more authors where the authors share credit for the work as a whole. Note that this entry type also covers the function of the `@inbook` type of traditional BibTeX, see section 2.3.1 for details.

Required fields: `author`, `title`, `year`

Optional fields: editor, translator, redactor, annotator, commentator, introduction, foreword, afterword, subtitle, titleaddon, maintitle, mainsubtitle, maintitleaddon, language, origlanguage, volume, part, edition, volumes, series, number, note, publisher, location, isbn, chapter, pages, pagetotal, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear

booklet A book-like work without a formal publisher or sponsoring institution. Use the field `howpublished` to supply publishing information in free format, if applicable. The field type may be useful as well.

Required fields: author/editor, title, year

Optional fields: subtitle, titleaddon, language, howpublished, type, note, location, chapter, pages, pagetotal, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear

collection A book with multiple, self-contained contributions by distinct authors which have their own title. The work as a whole has no overall author but it will usually have an editor.

Required fields: editor, title, year

Optional fields: translator, redactor, annotator, commentator, introduction, foreword, afterword, subtitle, titleaddon, maintitle, mainsubtitle, maintitleaddon, language, origlanguage, volume, part, edition, volumes, series, number, note, publisher, location, isbn, chapter, pages, pagetotal, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear

inbook A part of a book which forms a self-contained unit with its own title. Note that the profile of this entry type is different from standard BibTeX, see section 2.3.1.

Required fields: author, title, booktitle, year

Optional fields: bookauthor, editor, translator, redactor, annotator, commentator, introduction, foreword, afterword, subtitle, titleaddon, maintitle, mainsubtitle, maintitleaddon, booksubtitle, booktitleaddon, language, origlanguage, volume, part, edition, volumes, series, number, note, publisher, location, isbn, chapter, pages, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear

incollection A contribution to a collection which forms a self-contained unit with a distinct author and title. The author refers to the title, the editor to the booktitle, i. e., the title of the collection.

Required fields: author, editor, title, booktitle, year

Optional fields: translator, redactor, annotator, commentator, introduction, foreword, afterword, subtitle, titleaddon, maintitle, mainsubtitle, maintitleaddon, booksubtitle, booktitleaddon, language, origlanguage, volume, part, edition, volumes, series, number, note, publisher, location, isbn, chapter, pages, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear

- inproceedings** An article in a conference proceedings. This type is similar to `@incollection`. The only difference is that it supports an optional organization field.
- Required fields: author, editor, title, booktitle, year
- Optional fields: subtitle, titleaddon, maintitle, mainsubtitle, maintitleaddon, booksubtitle, booktitleaddon, eventtitle, venue, language, volume, part, volumes, series, number, note, organization, publisher, location, isbn, chapter, pages, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear
- manual** Technical or other documentation, not necessarily in printed form. The author or editor is omissible in terms of section 2.3.2.
- Required fields: author/editor, title, year
- Optional fields: subtitle, titleaddon, language, edition, type, series, number, version, note, organization, publisher, location, isbn, chapter, pages, pagetotal, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear
- misc** A fallback type for entries which do not fit into any other category. Use the field `howpublished` to supply publishing information in free format, if applicable. The field type may be useful as well. author, editor, and year are omissible in terms of section 2.3.2.
- Required fields: author/editor, title, year
- Optional fields: subtitle, titleaddon, language, howpublished, type, version, note, organization, location, date, day, month, year, addendum, doi, eprint, eprinttype, url, urldate, urlday, urlmonth, urlyear
- online** An online resource. author, editor, and year are omissible in terms of section 2.3.2. This entry type is intended for sources such as web sites which are intrinsically online resources. Note that all entry types support the `url` field. For example, when adding an article from a journal which happens to be available online, use the `@article` type and its `url` field.
- Required fields: author/editor, title, year, url
- Optional fields: subtitle, titleaddon, language, version, note, organization, date, day, month, year, addendum, urldate, urlday, urlmonth, urlyear
- patent** A patent or patent request. The number or record token is given in the number field. Use the `type` field to specify the type and the `location` field to indicate the scope of the patent, if different from the scope implied by the type. Note that the `location` field is treated as a key list with this entry type, see section 2.2.1 for details.
- Required fields: author, title, number, year
- Optional fields: holder, subtitle, titleaddon, type, version, location, note, date, day, month, year, addendum, url, urldate, urlday, urlmonth, urlyear
- periodical** An entire issue of a periodical, such as a special issue of a journal. The title of

the periodical is given in the title field. If the issue has its own title in addition to the main title of the periodical, it goes in the `issuetitle` field. The editor is omissible in terms of section 2.3.2.

Required fields: `editor`, `title`, `year`

Optional fields: `subtitle`, `issuetitle`, `issuesubtitle`, `language`, `series`, `volume`, `number`, `issue`, `date`, `day`, `month`, `year`, `note`, `issn`, `addendum`, `doi`, `eprint`, `eprinttype`, `url`, `urldate`, `urlday`, `urlmonth`, `urlyear`

proceedings The proceedings of a conference. This type is similar to `@collection`. The only difference is that it supports an optional `organization` field which holds the sponsoring institution. The editor is omissible in terms of section 2.3.2.

Required fields: `editor`, `title`, `year`

Optional fields: `subtitle`, `titleaddon`, `maintitle`, `mainsubtitle`, `maintitleaddon`, `eventtitle`, `venue`, `language`, `volume`, `part`, `volumes`, `series`, `number`, `note`, `organization`, `publisher`, `location`, `isbn`, `chapter`, `pages`, `pagetotal`, `addendum`, `doi`, `eprint`, `eprinttype`, `url`, `urldate`, `urlday`, `urlmonth`, `urlyear`

report A technical report, research report, or white paper published by a university or some other institution. Use the `type` field to specify the type of report. The sponsoring institution goes in the `institution` field.

Required fields: `author`, `title`, `type`, `institution`, `year`

Optional fields: `subtitle`, `titleaddon`, `language`, `number`, `version`, `note`, `location`, `isrn`, `chapter`, `pages`, `pagetotal`, `addendum`, `doi`, `eprint`, `eprinttype`, `url`, `urldate`, `urlday`, `urlmonth`, `urlyear`

set A reference set. This entry type is special, see section 3.10.5 for details.

Required fields: `entryset`, `crossref`

Optional fields: `all`

thesis A thesis written for an educational institution to satisfy the requirements for a degree. Use the `type` field to specify the type of thesis.

Required fields: `author`, `title`, `type`, `institution`, `year`

Optional fields: `subtitle`, `titleaddon`, `language`, `note`, `location`, `chapter`, `pages`, `pagetotal`, `addendum`, `doi`, `eprint`, `eprinttype`, `url`, `urldate`, `urlday`, `urlmonth`, `urlyear`

unpublished A work with an author and a title which has not been formally published, such as a manuscript or the script of a talk. Use the fields `howpublished` and `note` to supply additional information in free format, if applicable.

Required fields: `author`, `title`, `year`

Optional fields: `subtitle`, `titleaddon`, `language`, `howpublished`, `note`, `date`, `day`, `month`, `year`, `addendum`, `url`, `urldate`, `urlday`, `urlmonth`, `urlyear`

custom[a-f] Custom types for special bibliography styles. Not used by the standard styles.

2.1.2 Type aliases

The entry types listed in this section are provided for backwards compatibility with traditional BibTeX styles. These aliases are resolved by BibTeX as the data is exported. Bibliography styles will see the entry type the alias points to, not the alias name. All unknown entry types are generally exported as @misc.

- conference** A legacy alias of @inproceedings.
- electronic** An alias of @online.
- mastersthesis** Similar to @thesis except that the type field is optional and defaults to the localized term ‘Master’s thesis’. You may still use the type field to override that.
- phdthesis** Similar to @thesis except that the type field is optional and defaults to the localized term ‘PhD thesis’. You may still use the type field to override that.
- techreport** Similar to @report except that the type field is optional and defaults to the localized term ‘technical report’. You may still use the type field to override that.
- www** An alias of @online, provided for jurabib compatibility.

2.1.3 Unsupported types

The types in this section are similar to the custom types @customa to @customf, i. e., they will be exported from the bib file under their proper name rather than as @misc entries. This may be useful in custom bibliography styles. The standard bibliography styles provide no dedicated support for these types. When using the standard styles, they will either be ignored or treated as aliases of a related generic type (see below for details).

- artwork** Works of the visual arts such as paintings, sculpture, and installations. This type is currently ignored by the standard styles.
- audio** Audio recordings, typically on audio CD, DVD, audio cassette, or similar media. This type is currently ignored by the standard styles. See also @music.
- commentary** Commentaries which have a status different from regular books, such as legal commentaries. This type is currently ignored by the standard styles.
- image** Images, pictures, photographs, and similar media. This type is currently ignored by the standard styles.
- jurisdiction** Court decisions, court recordings, and similar things. This type is currently ignored by the standard styles.
- legislation** Laws, bills, legislative proposals, and similar things. This type is currently ignored by the standard styles.
- legal** Legal documents such as treaties. This type is currently ignored by the standard styles.
- letter** Personal correspondence such as letters, emails, memoranda, etc. This type is currently ignored by the standard styles.

- movie** Motion pictures. This type is currently ignored by the standard styles. See also `@video`.
- music** Musical recordings. This is a more specific variant of `@audio`. This type is currently ignored by the standard styles.
- performance** Musical and theatrical performances as well as other works of the performing arts. This type refers to the event as opposed to a recording, a score, or a printed play. This type is currently ignored by the standard styles.
- reference** Works of reference such as encyclopedias and dictionaries. This is a more specific variant of the generic `@collection` entry type. The standard styles will treat this entry type as an alias of `@collection`.
- inreference** Articles in a work of reference. This is a more specific variant of the generic `@incollection` entry type. The standard styles will treat this entry type as an alias of `@incollection`.
- review** Reviews of some other work. This is a more specific variant of the `@article` type. The standard styles will treat this entry type as an alias of `@article`.
- software** Computer software. This type is currently ignored by the standard styles.
- standard** National and international standards issued by a standards body such as the International Organization for Standardization. This type is currently ignored by the standard styles.
- suppbook** Supplemental material in a `@book`. This type is closely related to the `@inbook` entry type. While `@inbook` is primarily intended for a part of a book with its own title (e.g., a single essay in a collection of essays by the same author), this type is provided for elements such as prefaces, introductions, forewords, afterwords, etc. which often have a generic title only. Style guides may require such items to be formatted differently from other `@inbook` items. The standard styles will treat this entry type as an alias of `@inbook`.
- suppcollection** Supplemental material in a `@collection`. This type is similar to `@suppbook` but related to the `@collection` entry type. The standard styles will treat this entry type as an alias of `@incollection`.
- suppperiodical** Supplemental material in a `@periodical`. This type is similar to `@suppbook` but related to the `@periodical` entry type. The role of this entry type may be more obvious if you bear in mind that the `@article` type could also be called `@inperiodical`. This type may be useful when referring to items such as regular columns, obituaries, letters to the editor, etc. which only have a generic title. Style guides may require such items to be formatted differently from articles in the strict sense of the word. The standard styles will treat this entry type as an alias of `@article`.
- video** Audiovisual recordings, typically on DVD, VHS cassette, or similar media. This type is currently ignored by the standard styles. See also `@movie`.

2.2 Entry fields

This section gives an overview of the fields supported by `biblatex`. See 2.2.1 for an introduction to the data types supported by this package and sections 2.2.2 and 2.2.3 for the actual field listings.

2.2.1 Data types

In `bib` files all bibliographic data is specified in fields. Some of those fields, for example `author` and `editor`, may contain a list of items. This list structure is implemented by BibTeX via the keyword ‘`and`’, which is used to separate the individual items in the list. The `biblatex` package implements three distinct data types to handle bibliographic data: name lists, literal lists, and fields. There are also several list and field subtypes. This section gives an overview of the data types supported by this package. See sections 2.2.2 and 2.2.3 for information about the mapping of BibTeX’s fields to `biblatex`’s data types.

Name lists are parsed and split up into the individual items at the `and` delimiter. Each item in the list is then dissected into four name components: the first name, the name prefix (von, van, of, da, de, della, . . .), the last name, and the name suffix (junior, senior, . . .). Name lists may be truncated in the `bib` file with the keyword ‘`and others`’. Typical examples of name lists are `author` and `editor`.

Literal lists are parsed and split up into the individual items at the `and` delimiter but not dissected further. Literal lists may be truncated in the `bib` file with the keyword ‘`and others`’. There are two subtypes:

Literal lists in the strict sense are handled as described above. The individual items are simply printed as is. Typical examples of such literal lists are `publisher` and `location`.

Key lists are a variant of literal lists which may hold printable data or localization keys. For each item in the list, a test is performed to determine whether it is a known localization key (the localization keys defined by default are listed in section 4.8.2). If so, the localized string is printed. If not, the item is printed as is. A typical example of a key list is `language`.

Fields are usually printed as a whole. There are several subtypes:

Literal fields are printed as is. Typical examples of literal fields are `title` and `note`.

Range fields are literal fields with one special feature: all dashes are normalized and replaced by the command `\bibrangedash`. Any number of consecutive dashes will only yield a single range dash. Typical examples of range fields are `year` and `pages`.

Integer fields hold unformatted integers which may be converted to ordinals or strings as they are printed. Typical examples of integer fields are `day` and `month`.

Date fields hold a date specification in ISO-8601 format (yyyy-mm-dd). Date fields are special in that the date is parsed and split up at the dashes. A typical example is the `date` field.

Verbatim fields are processed in verbatim mode and may contain special characters. Typical examples of verbatim fields are `url` and `doi`.

Key fields may hold printable data or localization keys. A test is performed to determine whether the value of the field is a known localization key (the localization keys defined by default are listed in section 4.8.2). If so, the localized string is printed. If not, the value is printed as is. A typical example is the `type` field.

Special fields are fields which require a special format not mentioned above. The field description will include details on the required format in this case. Typical examples are the fields `hyphenation`, `keywords`, and `gender` from section 2.2.3.

The data type of a field will usually not change, regardless of the type of entry it is used in. However, there are a few special cases. The field descriptions in section 2.2.2 include the details or pointers to the relevant sections in this manual in such cases. For example, the `location` field, which is a literal list by default, is treated as a key list when used in `@patent` entries. The `series` field, which is a literal field by default, is handled in a special way when used in `@article` entries, see section 2.3.6 for details.

2.2.2 Data fields

The fields listed in this section are the regular ones holding printable data. The name on the left is the name of the field, as used by both BibTeX and biblatex. The biblatex data type is given to the right of the name. See section 2.2.1 for explanation of the various data types.

abstract field (literal)

This field is intended for recording abstracts in a bib file, to be printed by a special bibliography style. It is not used by all standard bibliography styles.

addendum field (literal)

Miscellaneous bibliographic data to be printed at the end of the entry. This is similar to the `note` field except that it is printed at the end of the bibliography entry.

afterword list (name)

The author(s) of an afterword to the work. If the author of the afterword is identical to the editor and/or translator, the standard styles will automatically concatenate these fields in the bibliography. See also introduction and foreword.

annotation field (literal)

This field may be useful when implementing a style for annotated bibliographies.

It is not used by all standard bibliography styles. Note that this field is completely unrelated to `annotator`. The `annotator` is the author of annotations which are part of the work cited.

`annotator` list (name)

The author(s) of annotations to the work. If the `annotator` is identical to the `editor` and/or `translator`, the standard styles will automatically concatenate these fields in the bibliography. See also `commentator`.

`author` list (name)

The author(s) of the `title`.

`authortype` field (key)

The type of author. This field will affect the string (if any) used to introduce the author. Not used by the standard bibliography styles.

`bookauthor` list (name)

The author(s) of the `booktitle`.

`bookpagination` field (key)

If the work is published as part of another one, this is the pagination scheme of the enclosing work, i. e., `bookpagination` relates to pagination like `booktitle` to `title`. The value of this field will affect the formatting of the `pages` and `pagetotal` fields. The key should be given in the singular form. Possible keys are `page`, `column`, `line`, `verse`, `section`, and `paragraph`. See also pagination as well as section 2.3.9.

`booksubtitle` field (literal)

The subtitle related to the `booktitle`. If the `subtitle` field refers to a work which is part of a larger publication, a possible subtitle of the main work is given in this field. See also `subtitle`.

`booktitle` field (literal)

If the `title` field indicates the title of a work which is part of a larger publication, the title of the main work is given in this field. See also `title`.

`booktitleaddon` field (literal)

An annex to the `booktitle`, to be printed in a different font.

`chapter` field (literal)

A chapter or section or any other unit of a work.

`commentator` list (name)

The author(s) of a commentary to the work. Note that this field is intended for commented editions which have a `commentator` in addition to the `author`. If the work is a stand-alone commentary, the `commentator` should be given in the `author`

field. If the commentator is identical to the editor and/or translator, the standard styles will automatically concatenate these fields in the bibliography. See also annotator.

date field (date)

A date specification, for example the publication date of a daily paper. The date is given in ISO-8601 format (yyyy-mm-dd). See also section 2.3.8.

day field (integer)

The day of the month in a date specification. This must be an integer, not an ordinal. Don't say `day={1st}` but `day={1}`. The bibliography style converts this to a language-dependent ordinal where required. See also date and section 2.3.8.

doi field (verbatim)

The Digital Object Identifier of the work.

edition field (integer or literal)

The edition of a printed publication. This must be an integer, not an ordinal. Don't say `edition={First}` or `edition={1st}` but `edition={1}`. The bibliography style converts this to a language-dependent ordinal. It is also possible to give the edition as a literal string, for example "Third, revised and expanded edition".

editor list (name)

The editor(s) of the title, booktitle, or maintitle, depending on the entry type.

editortype field (key)

The type of editor. This field will affect the string used to introduce the editor. Currently supported types are editor and compiler.

eid field (literal)

The electronic identifier of an @article.

eprint field (verbatim)

The identifier of an online publication. This is roughly comparable to a DOI. See section 3.10.6 for details.

eprinttype field (literal)

The type of eprint identifier. See section 3.10.6 for details.

eventtitle field (literal)

The title of a conference, symposium, etc. in @proceedings and @inproceedings entries.

- file** field (verbatim)
A local link to a PDF or other version of the work. Not used by the standard bibliography styles.
- foreword** list (name)
The author(s) of a foreword to the work. If the author of the foreword is identical to the editor and/or translator, the standard styles will automatically concatenate these fields in the bibliography. See also [introduction](#) and [afterword](#).
- holder** list (name)
The holder(s) of a `@patent`, if different from the author. Note that corporate holders need to be wrapped in an additional set of braces, see [2.3.3](#) for details. This list may also be useful for the custom types listed in section [2.1.3](#).
- howpublished** field (literal)
A publication notice for unusual publications which do not fit into any of the common categories.
- indextitle** field (literal)
A title to use for indexing instead of the regular `title` field. This field may be useful if you have an entry with a title like “An Introduction to ...” and want that indexed as “Introduction to ..., An”. Style authors should note that `biblatex` automatically copies the value of the `title` field to `indextitle` if the latter field is undefined.
- institution** list (literal)
The name of a university or some other institution, depending on the entry type. Traditional BibTeX uses the field name `school` for theses, which is supported as an alias. See also sections [2.2.5](#) and [2.3.4](#).
- introduction** list (name)
The author(s) of an introduction to the work. If the author of the introduction is identical to the editor and/or translator, the standard styles will automatically concatenate these fields in the bibliography. See also [foreword](#) and [afterword](#).
- isan** field (literal)
The International Standard Audiovisual Number of an audiovisual work. Not used by the standard bibliography styles.
- isbn** field (literal)
The International Standard Book Number of a book.
- ismn** field (literal)
The International Standard Music Number for printed music such as musical scores. Not used by the standard bibliography styles.

- isrn** field (literal)
The International Standard Technical Report Number of a technical report.
- issn** field (literal)
The International Standard Serial Number of a periodical.
- issue** field (literal)
The issue of a journal. This field is intended for journals whose individual issues are identified by a designation such as ‘Spring’ or ‘Summer’ rather than the month or a number. Since the placement of `issue` is similar to `month` and `number`, this field may also be useful with double issues and other special cases. See also `month`, `number`, and section 2.3.7.
- issuesubtitle** field (literal)
The subtitle of a specific issue of a journal or other periodical.
- issuetitle** field (literal)
The title of a specific issue of a journal or other periodical.
- iswc** field (literal)
The International Standard Work Code of a musical work. Not used by the standard bibliography styles.
- journalsubtitle** field (literal)
The subtitle of a journal, a newspaper, or some other periodical.
- journaltitle** field (literal)
The name of a journal, a newspaper, or some other periodical.
- label** field (literal)
A designation to be used by the citation style as a substitute for the regular label if any data required to generate the regular label is missing. For example, when an author-year citation style is generating a citation for an entry which is missing the author or the year, it may fall back to `label`. See section 2.3.2 for details. Note that, in contrast to `shorthand`, `label` is only used as a fallback. See also `shorthand`.
- language** list (key)
The language(s) of the work. Languages may be specified literally or as localization keys. If localization keys are used, the prefix `lang` is omissible. See also `origlanguage` and compare hyphenation in section 2.2.3.
- library** field (literal)
This field may be useful to record information such as a library name and a call number. This may be printed by a special bibliography style if desired. Not used by the standard bibliography styles.

- location** list (literal)
- The place(s) of publication, i. e., the location of the publisher or institution, depending on the entry type. Traditional BibTeX uses the field name `address`, which is supported as an alias. See also sections 2.2.5 and 2.3.4. With `@patent` entries, this list indicates the scope of a patent and is treated as a key list. This list may also be useful for the custom types listed in section 2.1.3.
- mainsubtitle** field (literal)
- The subtitle related to the maintitle. See also `subtitle`.
- maintitle** field (literal)
- The main title of a multi-volume book, such as *Collected Works*. If the `title` or `booktitle` field indicates the title of a single volume which is part of multi-volume book, the title of the complete work is given in this field.
- maintitleaddon** field (literal)
- An annex to the `maintitle`, to be printed in a different font.
- month** field (integer)
- The month in which the work was published or the month in a date specification. This must be an integer, not an ordinal or a string. Don't say `month={January}` but `month={1}`. The bibliography style converts this to a language-dependent string or ordinal where required. See also `date` as well as sections 2.3.7 and 2.3.8.
- nameaddon** field (literal)
- An addon to be printed immediately after the author name in the bibliography. Not used by the standard bibliography styles. This field may be useful to add an alias or pen name (or give the real name if the pseudonym is commonly used to refer to that author).
- note** field (literal)
- Miscellaneous bibliographic data which does not fit into any other field. The `note` field may be used to record bibliographic data in a free format. Publication facts such as "Reprint of the edition London 1831" are typical candidates for the `note` field. See also `addendum`.
- number** field (literal)
- The number of a journal or the volume/number of a book in a series. See also `issue` as well as sections 2.3.6 and 2.3.7. With `@patent` entries, this is the number or record token of a patent or patent request.
- organization** list (literal)
- The organization(s) that published a `@manual` or an `@online` resource, or sponsored a conference. See also section 2.3.4.

- origlanguage** field (key)
If the work is a translation, the language of the original work. See also [language](#).
- origlocation** list (literal)
If the work is a translation, a reprint, or something similar, the location of the original edition. Not used by the standard bibliography styles. See also [location](#) and section [2.3.4](#).
- origpublisher** list (literal)
If the work is a translation, a reprint, or something similar, the publisher of the original edition. Not used by the standard bibliography styles. See also [publisher](#) and section [2.3.4](#).
- origtitle** field (literal)
If the work is a translation, the title of the original work. Not used by the standard bibliography styles. See also [title](#).
- origyear** field (range)
If the work is a translation, a reprint, or something similar, the year of publication of the original edition. Not used by the standard bibliography styles. See also [year](#).
- pages** field (range)
One or more page numbers or page ranges. If the work is published as part of another one, such as an article in a journal or a collection, this field holds the relevant page range in that other work. It may also be used to limit the reference to a specific part of a work (a chapter in a book, for example).
- pagetotal** field (literal)
The total number of pages of the work.
- pagination** field (key)
The pagination of the work. The value of this field will affect the formatting the *<postnote>* argument to a citation command. The key should be given in the singular form. Possible keys are [page](#), [column](#), [line](#), [verse](#), [section](#), and [paragraph](#). See also [bookpagination](#) as well as sections [2.3.9](#) and [3.II.3](#).
- part** field (literal)
The number of a partial volume. This field applies to books only, not to journals. It may be used when a logical volume consists of two or more physical ones. In this case the number of the logical volume goes in the [volume](#) field and the number of the part of that volume in the [part](#) field. See also [volume](#).
- publisher** list (literal)
The name(s) of the publisher(s). See also section [2.3.4](#).

- redactor** list (name)
- The redactor(s) of the work. Redactors are secondary editors which differ from commentators and annotators in that they usually do not add anything of their own when editing the text. They differ from the (primary) editors in that they are not in charge of the publication.
- reprinttitle** field (literal)
- The title of a reprint of the work. Not used by the standard styles.
- series** field (literal)
- The name of a publication series, such as “Studies in ...”, or the number of a journal series. A publication series is usually numbered. The number or volume of a book in a series is given in the number field. Note that the `@article` entry type makes use of the `series` field as well, but handles it in a special way. See section 2.3.6 for details.
- shortauthor** list (name)
- The author(s) of the work, given in an abbreviated form. This field is mainly intended for abbreviated forms of corporate authors, see section 2.3.3 for details.
- shorteditor** list (name)
- The editor(s) of the work, given in an abbreviated form. This field is mainly intended for abbreviated forms of corporate editors, see section 2.3.3 for details.
- shorthand** field (literal)
- A special designation to be used by the citation style instead of the usual label. This field is intended for citation aliasing. If defined, it overrides the default label. If any of the cited bibliography entries includes a shorthand field, `biblatex` automatically builds a list of shorthands which may be printed in addition to the regular bibliography; see section 3.5.2 for details. See also `label`.
- shorthandintro** field (literal)
- The verbose citation styles which comes with this package use a phrase like “henceforth cited as [shorthand]” to introduce shorthands on the first citation. If the `shorthandintro` field is defined, it overrides the standard phrase. Note that the alternative phrase must include the shorthand.
- shortjournal** field (literal)
- A short version or an acronym of the `journaltitle`. Not used by the standard bibliography styles.
- shortseries** field (literal)
- A short version or an acronym of the `series` field. Not used by the standard bibliography styles.

- shorttitle** field (literal)
The title in an abridged form. This field is usually not included in the bibliography. It is intended for citations in author-title format. If present, the author-title citation styles use this field instead of `title`.
- subtitle** field (literal)
The subtitle of the work.
- title** field (literal)
The title of the work.
- titleaddon** field (literal)
An annex to the `title`, to be printed in a different font.
- translator** list (name)
The translator(s) of the `title` or `booktitle`, depending on the entry type. If the translator is identical to the editor, the standard styles will automatically concatenate these fields in the bibliography.
- type** field (key)
The type of a manual, patent, report, or thesis. This field may also be useful for the custom types listed in section [2.1.3](#).
- url** field (verbatim)
The URL of an online publication.
- urldate** field (date)
Similar to the `date` field but referring to the retrieval date of the address specified in the `url` field. In contrast to the `date` field, `urldate` should not be truncated. See also `date` and section [2.3.8](#).
- urlday** field (integer)
Similar to the `day` field but referring to the day on which the address specified in the `url` field was last visited. See also `day` and `urldate` as well as section [2.3.8](#).
- urlmonth** field (integer)
Similar to the `month` field but referring to the month in which the address specified in the `url` field was last visited. See also `month` and `urldate` as well as section [2.3.8](#).
- urlyear** field (integer)
The year in which the address specified in the `url` field was last visited. In contrast to the `year` field, this field must be an integer. See also `year` and `urldate` as well as section [2.3.8](#).

venue field (literal)

The location of a conference or some other event. Note that the `location` list holds the place of publication. It therefore corresponds to the `publisher` and `institution` lists. With `@proceedings` and `@inproceedings` entries, the location of the conference is given in the `venue` field. This field may also be useful for the custom types listed in section 2.1.3.

version field (literal)

The revision number of a piece of software, a manual, etc.

volume field (literal)

The volume of a multi-volume book or a periodical. See also `part`.

volumes field (literal)

The total number of volumes of a multi-volume work. Depending on the entry type, this field refers to `title` or `maintitle`.

year field (range)

The year of publication or the year in a date specification. See also `date` and section 2.3.8.

2.2.3 Special fields

The fields listed in this section do not hold printable data but serve a different purpose. They apply to all entry types.

crossref field (entry key)

This field holds an entry key for BibTeX's cross-referencing feature. It is used internally by BibTeX. Child entries with a `crossref` field inherit all data from the parent entry specified in the `crossref` field. If the number of child entries referencing a specific parent entry hits a certain threshold, the parent entry is automatically added to the bibliography even if it has not been cited explicitly. This threshold is settable on the command-line as BibTeX is launched and defaults to 2.¹ Style authors should note that whether or not the `crossref` fields of the child entries are defined on the `biblatex` level depends on the availability of the parent entry. If the parent entry is available, the `crossref` fields of the child entries will be defined. If not, the child entries still inherit the data from the parent entry but their `crossref` fields will be undefined. Whether the parent entry is added to the bibliography implicitly because of the threshold or explicitly because it has been cited does not matter. See also `xref`.

entryset field (comma-separated values)

This field is specific to `@set` parent entries and the child entries of the reference set. In the parent entry, it is a comma-separated list of entry keys which make up

¹ Also see the `mincrossrefs` package option in section 3.1.3.

Language	Region/Dialect	Babel Identifiers
Danish	Denmark	danish
English	USA	american, USenglish, english
	United Kingdom	british, UKenglish
	Canada	canadian
	Australia	australian
	New Zealand	newzealand
French	France, Canada	french, francais, canadien
German	Germany	german, ngerman
	Austria	austrian, naustrian
Italian	Italy	italian
Norwegian	Norway	norsk, nynorsk
Portuguese	Brazil	brazil
	Portugal	portuges
Spanish	Spain	spanish
Swedish	Sweden	swedish

Table 1: Supported languages

a reference set. In the child entries, it is the entry key of the parent. See section 3.10.5 for details.

entrysubtype field (identifier)

This field, which is not used by the standard styles, may be used to specify a subtype of an entry type. This may be useful for bibliography styles which support a finer-grained set of entry types.

execute field (code)

A special field which holds arbitrary TeX code to be executed whenever the data of the respective entry is accessed. This may be useful to handle special cases. Conceptually, this field is comparable to the hooks `\AtEveryBibitem`, `\AtEveryLositem`, and `\AtEveryCitekey` from section 4.9.6, except that it is definable on a per-entry basis in the `bib` file. Any code in this field is executed automatically immediately after these hooks.

gender field (sf, sm, sn, pf, pm, pn, pp)

The gender of the author or the gender of the editor, if there is no author. The following identifiers are supported: `sf` (feminine singular, a single female name), `sm` (masculine singular, a single male name), `sn` (neuter singular, a single neuter name), `pf` (feminine plural, a list of female names), `pm` (masculine plural, a list of male names), `pn` (neuter plural, a list of neuter names), `pp` (plural, a mixed gender list of names). This information is only required by special bibliography and citation styles and only in certain languages. For example, a citation style may replace recurrent author names with a term such as ‘idem’. If the Latin word is used, as is custom in English and French, there is no need to specify the gender. In German publications, however, such key terms are usually given in German and in this case they are gender-sensitive.

hyphenation field (identifier)

The language of the bibliography entry. The identifier must be a language name known to the `babel` package. This information may be used to switch hyphenation patterns and localize strings in the bibliography. Note that the language names are case sensitive. The languages currently supported by this package are given in table 1. Note that `babel` treats the identifier `english` as an alias of `british` or `american`, depending on the `babel` version. The `biblatex` package always treats it as an alias of `american`. It is preferable to use the language identifiers `american` and `british` to avoid any possible confusion. Compare `language` in section 2.2.2.

indexsorttitle field (literal)

The title used when sorting the index. In contrast to `indextitle`, this field is used for sorting only. The printed title in the index is the `indextitle` or the `title` field. This field may be useful if the title contains special characters or commands which interfere with the sorting of the index. Consider this example:

```
title           = {The \LaTeX\ Companion},
indextitle      = {\LaTeX\ Companion, The},
indexsorttitle = {LATEX Companion},
```

Style authors should note that `biblatex` automatically copies the value of either the `indextitle` or the `title` field to `indexsorttitle` if the latter field is undefined.

keywords field (comma-separated values)

A comma-separated list of keywords. These keywords are intended for the bibliography filters (see sections 3.5.1 and 3.10.4), they are usually not printed. Note that spaces after commas are ignored.

options field (comma-separated $\langle key \rangle = \langle value \rangle$ options)

A comma-separated list of entry options in $\langle key \rangle = \langle value \rangle$ notation. This field is used to set options on a per-entry basis. See section 3.1.4 for details. Note that citation and bibliography styles may define additional entry options.

presort field (string)

A field used to modify the sorting order of the bibliography. This field is the first thing the sorting algorithm considers when sorting the bibliography, hence it may be used to drastically change the sorting order. This field is only used internally by BibTeX. The default value of this string is `mm`, hence you may use the values `aa` through `m1` to move an entry towards the top of the list and `mn` through `zz` to move it towards the bottom. This may be useful when creating subdivided bibliographies with the bibliography filters. Please refer to section 3.4 for an in-depth explanation of the sorting process.

sortkey field (literal)

A field used to modify the sorting order of the bibliography. Think of this field as

the master sort key. If present, `biblatex` uses this field during sorting and ignores everything else, except for the `presort` field. This field is only used internally during sorting. Please refer to section 3.4 for an in-depth explanation of the sorting process.

`sortname` list (name)

A name or a list of names used to modify the sorting order of the bibliography. If present, this list is used instead of `author` or `editor` when sorting the bibliography. It is only used internally during sorting. Please refer to section 3.4 for an in-depth explanation of the sorting process.

`sorttitle` field (literal)

A field used to modify the sorting order of the bibliography. If present, this field is used instead of the `title` field when sorting the bibliography. It is only used internally during sorting. The `sorttitle` field may come in handy if you have an entry with a title like “An Introduction to . . .” and want that alphabetized under ‘I’ rather than ‘A’. In this case, you could put “Introduction to . . .” in the `sorttitle` field. Please refer to section 3.4 for an in-depth explanation of the sorting process.

`sortyear` field (literal)

A field used to modify the sorting order of the bibliography. If present, this field is used instead of the `year` field when sorting the bibliography. It is only used internally during sorting. Please refer to section 3.4 for an in-depth explanation of the sorting process.

`xref` field (entry key)

This field provides an alternative cross-referencing mechanism. It differs from `crossref` in that the child entry will not inherit any data from the parent entry specified in the `xref` field. If the number of child entries referencing a specific parent entry hits a certain threshold, the parent entry is automatically added to the bibliography even if it has not been cited explicitly. This threshold is settable with the `mincrossrefs` package option from section 3.1.3. Style authors should note that whether or not the `xref` fields of the child entries are defined on the `biblatex` level depends on the availability of the parent entry. If the parent entry is available, the `xref` fields of the child entries will be defined. If not, their `xref` fields will be undefined. Whether the parent entry is added to the bibliography implicitly because of the threshold or explicitly because it has been cited does not matter. Please refer to section 2.4.1 for further explanation. See also `crossref`.

2.2.4 Custom fields

The fields listed in this section are intended for special bibliography styles. They are not used by the standard bibliography styles.

`name[a–c]` list (name)

Custom lists for special bibliography styles. Not used by the standard bibliography styles.

`name[a-c]type` field (key)
Similar to `author` and `editor` but referring to the fields `name[a-c]`. Not used by the standard bibliography styles.

`list[a-f]` list (literal)
Custom lists for special bibliography styles. Not used by the standard bibliography styles.

`user[a-f]` field (literal)
Custom fields for special bibliography styles. Not used by the standard bibliography styles.

`verb[a-c]` field (literal)
Similar to the custom fields above except that these are verbatim fields. Not used by the standard bibliography styles.

2.2.5 Field aliases

The aliases listed in this section are provided for backwards compatibility with traditional BibTeX and other applications based on traditional BibTeX styles. Note that these aliases are immediately resolved as the `bib` file is processed. All bibliography and citation styles must use the names of the fields they point to, not the alias. In `bib` files, you may use either the alias or the field name but not both at the same time.

`address` list (literal)
An alias of `location`, see section 2.2.2. Traditional BibTeX uses the slightly misleading field name `address` for the place of publication, i. e., the location of the publisher. This package uses `location` for that, but `address` is supported as an alias. See also section 2.3.4.

`annotate` field (literal)
An alias of `annotation`, provided for `jurabib` compatibility.

`journal` field (literal)
An alias of `journaltitle`, see section 2.2.2.

`key` field (literal)
An alias of `sortkey`, see section 2.2.3.

`pdf` field (verbatim)
An alias of `file`, see section 2.2.2. This alias is provided for JabRef compatibility.

`school` list (literal)
An alias of `institution`, see section 2.2.2. The `institution` field is used by traditional BibTeX for technical reports whereas the `school` field holds the institu-

tion associated with theses. This package employs `institution` in both cases, but `school` is supported as an alias. See also section 2.3.4.

2.3 Usage notes

The entry types and fields supported by this package should for the most part be intuitive to use for anyone familiar with BibTeX. However, apart from the additional types and fields provided by this package, some of the familiar ones are handled in a way which is in need of explanation. This package includes some compatibility code for `bib` files which were generated with a traditional BibTeX style in mind. Unfortunately, it is not possible to handle all legacy files automatically because `biblatex`'s data model is slightly different from traditional BibTeX. Therefore, such `bib` files will most likely require editing in order to work properly with this package. In sum, the following items are different from traditional BibTeX styles:

- The entry type `@inbook`. See sections 2.1.1 and 2.3.1 for details.
- The fields `institution`, `organization`, and `publisher` as well as the aliases `address` and `school`. See sections 2.2.2, 2.2.5, and 2.3.4 for details.
- The handling of certain types of titles. See section 2.3.5 for details.
- The field `series`. See sections 2.2.2 and 2.3.6 for details.
- The field `month`. See sections 2.2.2 and 2.3.7 for details.
- The field `edition`. See section 2.2.2 for details.
- The field `key`. See section 2.3.2 for details.

Users of the `jurabib` package should note that the `shortauthor` field is treated as a name list by `biblatex`, see section 2.3.3 for details.

2.3.1 The entry type `@inbook`

Use the `@inbook` entry type for a self-contained part of a book with its own title only. It relates to `@book` just like `@incollection` relates to `@collection`. See section 2.3.5 for examples. If you want to refer to a chapter or section of a book, simply use the `book` type and add a `chapter` and/or `pages` field. Whether a bibliography should at all include references to chapters or sections is controversial because a chapter is not a bibliographic entity.

2.3.2 Missing and omissible data

The fields marked as 'required' in section 2.1.1 are not strictly required in all cases. The bibliography styles which ship with this package can get by with as little as a `title` field for most entry types. A book published anonymously, a periodical without an explicit editor, or a software manual without an explicit author should pose no problem as far as the bibliography is concerned. Citation styles, however, may have different requirements. For example, an author-year citation scheme obviously requires an `author/editor` and a `year` field.

You may generally use the `label` field to provide a substitute for any missing data required for citations. How the `label` field is employed depends on the citation style. The author-year citation styles which come with this package use the `label` field as a fallback if either the `author/editor` or the `year` is missing. The

numeric styles, on the other hand, do not use it at all since the numeric scheme is independent of the available data. The author-title styles ignore it as well, because the bare title is usually sufficient to form a unique citation and a title is expected to be available in any case. The `label` field may also be used to override the non-numeric portion of the automatically generated `labelalpha` field used by alphabetic citation styles. See section 4.2.4 for details.

Note that traditional BibTeX styles support a `key` field which is used for alphabetizing if both `author` and `editor` are missing. The `biblatex` package treats `key` as an alias of `sortkey`. In addition to that, it offers very fine-grained sorting controls, see sections 2.2.3 and 3.4 for details. The `natbib` package employs the `key` field as a fallback label for citations. Use the `label` field instead.

2.3.3 Corporate authors and editors

Corporate authors and editors are given in the `author` or `editor` field, respectively. Note that they should be wrapped in an extra pair of curly braces to prevent BibTeX from treating them as personal names which are to be dissected into their components. Use the `shortauthor` field if you want to give an abbreviated form of the name or an acronym for use in citations.

```
author      = {{National Aeronautics and Space Administration}},
shortauthor = {NASA},
```

The default citation styles will use the short name in all citations while the full name is printed in the bibliography. For corporate editors, use the corresponding fields `editor` and `shorteditor`. Since all of these fields are treated as name lists, it is possible to mix personal names and corporate names, provided that the names of all corporations and institutions are wrapped in braces.

```
editor      = {{National Aeronautics and Space Administration}
               and Doe, John},
shorteditor = {NASA and Doe, John},
```

Users switching from the `jurabib` package to `biblatex` should note that the `shortauthor` field is treated as a name list.

2.3.4 Literal lists

The fields `institution`, `organization`, `publisher`, and `location` are literal lists in terms of section 2.2. This also applies to `origlocation`, `origpublisher` and to the field aliases `address` and `school`. All of these fields may contain a list of items separated by the keyword ‘and’. If such fields contains a literal ‘and’, it must be wrapped in braces.

```
publisher   = {William Reid {and} Company},
institution = {Office of Information Management {and} Communications},
organization = {American Society for Photogrammetry {and} Remote Sensing
               and American Congress on Surveying {and} Mapping},
```

Note the difference between a literal ‘`{and}`’ and the list separator ‘and’ in the above examples. Legacy files which have not been updated for use with `biblatex` will still work if these fields do not contain a literal ‘and’. However, note that

you will miss out on the additional features of literal lists in this case, such as configurable formatting and automatic truncation.

2.3.5 Titles

The following examples demonstrate how to handle different types of titles. Let's start with a five-volume work which is referred to as a whole:

```
@Book{works,  
  author   = {Shakespeare, William},  
  title    = {Collected Works},  
  volumes  = {5},  
  ...
```

The individual volumes of a multi-volume work usually have a title of their own. Suppose the fourth volume of the *Collected Works* includes Shakespeare's sonnets and we are referring to this volume only:

```
@Book{sonnets,  
  author    = {Shakespeare, William},  
  maintitle = {Collected Works},  
  title     = {Sonnets},  
  volume    = {4},  
  ...
```

In the next example, we are referring to a part of a volume, but this part is a self-contained work with its own title. Of course the respective volume also has a title and there is still the main title of the entire edition:

```
@InBook{lear,  
  author      = {Shakespeare, William},  
  bookauthor  = {Shakespeare, William},  
  maintitle   = {Collected Works},  
  booktitle   = {Tragedies},  
  title       = {King Lear},  
  volume      = {1},  
  pages       = {53-159},  
  ...
```

Suppose the first volume of the *Collected Works* includes a reprinted essay by a well-known scholar. This is not the usual introduction by the editor but a self-contained work. The *Collected Works* also have a separate editor:

```
@InBook{stage,  
  author      = {Expert, Edward},  
  title       = {Shakespeare and the Elizabethan Stage},  
  bookauthor  = {Shakespeare, William},  
  editor      = {Bookmaker, Bernard},  
  maintitle   = {Collected Works},  
  booktitle   = {Tragedies},  
  volume      = {1},  
  pages       = {7-49},  
  ...
```

See section 2.3.6 for further examples.

2.3.6 Publication and journal series

The `series` field is used by traditional BibTeX styles for both the main title of a multi-volume work and a publication series, i. e., a loosely related sequence of books by the same publisher which deal with the same general topic or belong to the same field of research. This may be ambiguous. This package introduces a `maintitle` field for multi-volume works and employs `series` for publication series only. The volume or number of a book in the series goes in the `number` field in this case:

```
@Book{...,
  author      = {Edward Expert},
  title       = {Shakespeare and the Elizabethan Age},
  series      = {Studies in English Literature and Drama},
  number      = {57},
  ...
```

The `@article` entry type makes use of the `series` field as well, but handles it in a special way. First, a test is performed to determine whether the value of the field is an integer. If so, it will be printed as an ordinal. If not, another test is performed to determine whether it is a localization key. If so, the localized string is printed. If not, the value is printed as is. Consider the following example of a journal published in numbered series:

```
@Article{...,
  journal      = {Journal Name},
  series       = {3},
  volume      = {15},
  number      = {7},
  year        = {1995},
  ...
```

This entry will be printed as “*Journal Name*. 3rd ser. 15.7 (1995)”. Some journals use designations such as “old series” and “new series” instead of a number. Such designations may be given in the `series` field as well, either as a literal string or as a localization key. Consider the following example which makes use of the localization key `newseries`:

```
@Article{...,
  journal      = {Journal Name},
  series       = {newseries},
  volume      = {9},
  year        = {1998},
  ...
```

This entry will be printed as “*Journal Name*. New ser. 9 (1998)”. See section 4.8.2 for a list of localization keys defined by default.

2.3.7 Months and journal issues

The month field is an integer field. The bibliography style converts the month to a language-dependent string, ordinal, or date as required. For backwards compatibility, you may also use the following three-letter abbreviations in bib files: jan, feb, mar, apr, may, jun, jul, aug, sep, oct, nov, dec. Note that these abbreviations are BibTeX strings which must be given without any braces or quotes. When using them, don't say `month={jan}` or `month="jan"` but `month=jan`. It is not possible to specify a month such as `month={8/9}`. With special cases such as double issues of journals, the issue should be given in the `issue` field instead. The placement of the issue field in `@article` entries is similar to and overrides the month field.

2.3.8 Date specifications

There are two ways to specify a date. You may either use the fields `day`, `month`, and `year` or the `date` field, which requires a date specification in ISO-8601 format (`yyyy-mm-dd`). Bibliography styles must use the fields `year`, `month`, and `day` when printing a date. The `date` field is immediately dissected into its components as the bib file is processed. Partial date specifications are valid as long as parts of the date are omitted at the end only. For example, `date={1995-02}` is equivalent to `year={1995}` plus `month={02}`. `date={2002}` is equivalent to `year={2002}`. For the date on which an internet address was consulted, use the corresponding fields `urlday`/`urlmonth`/`urlyear` or `urldate`, which are handled in a similar way. In contrast to a publication date, the URL date should not be truncated.

2.3.9 Pagination

When specifying a page or page range, either in the `pages` field of an entry or in the `<postnote>` argument to a citation command, it is convenient to have biblatex add prefixes like 'p.' or 'pp.' automatically and this is indeed what this package does by default. However, some works may use a different pagination scheme or may not be cited by page but rather by verse or line number. This is when the `pagination` and `bookpagination` fields come into play. As an example, consider the following entry:

```
@InBook{key,
  title       = {...},
  pagination  = {verse},
  booktitle   = {...},
  bookpagination = {page},
  pages       = {53--65},
  ...
```

The `bookpagination` field affects the formatting of the `pages` and `pagetotal` fields in the list of references. Since `page` is the default, this field is omissible in the above example. In this case, the page range will be formatted as 'pp. 53–65'. Suppose that, when quoting from this work, it is customary to use verse numbers rather than page numbers in citations. This is reflected by the `pagination` field, which affects the formatting of the `<postnote>` argument to any citation command. With a citation like `\cite[17]{key}`, the postnote will be formatted as

'v. 17'. Setting the pagination field to section would yield '§ 17'. See section [3.11.3](#) for further usage instructions.

The pagination and bookpagination fields are key fields. This package will try to use their value as a localization key, provided that the key is defined. Always use the singular form of the key name in bib files, the plural is formed automatically. The keys page, column, line, verse, section, and paragraph are predefined, with page being the default. The string 'none' has a special meaning when used in a pagination or bookpagination field. It suppresses the prefix for the respective entry. If there are no predefined localization keys for the pagination scheme required by a certain entry, you can simply add them. See the commands `\NewBibliographyString` and `\DefineBibliographyStrings` in section [3.7](#). You need to define two bibliography strings for each additional pagination scheme: the singular form (whose localization key corresponds to the value of the pagination field) and the plural form (whose localization key must be the singular plus the letter 's'). See the predefined keys in section [4.8.2](#) for examples.

2.4 Hints and caveats

This section provides some additional hints concerning the BibTeX interface of this package. It also addresses some common problems.

2.4.1 Cross referencing

BibTeX's `crossref` field provides a handy cross-referencing mechanism which inherits data missing in a child entry from the corresponding parent entry indicated by the value of the `crossref` field. Unfortunately, this mechanism is static and uses a one-on-one field mapping. This reduces its usefulness significantly because it will cause problems in quite a few cases. For example, the subtitle of a cross-referenced `@collection` entry may end up in the `subtitle` field, rather than in the `booksubtitle` field, of the corresponding `@incollection` child entry. It is possible to work around this problem by including an empty `subtitle` in the child entry. This package also provides an alternative cross-referencing mechanism. The `xref` field differs from `crossref` in that the child entry will not inherit *any* data from the parent entry specified in the `xref` field. This implies that child entries must include all bibliographic data. The `xref` field is merely a pointer which may be used by bibliography styles which format child entries in a special way (see section [4.10.1](#) for an example). If the parent entry is referenced by a certain number of child entries, `biblatex` will automatically execute the equivalent of a `\nocite` command to request it from BibTeX. The threshold is controlled by the `mincrossrefs` package option from section [3.1.3](#). Style authors should note that whether or not the `xref` fields of the child entries are defined on the `biblatex` level depends on the availability of the parent entry. If the parent entry is available, the `xref` fields of the child entries will be defined. If not, their `xref` fields will be undefined. Whether the parent entry is added to the bibliography implicitly because of the threshold or because it has been cited explicitly in the document does not matter.

Parameter	Switch	Capacity			
		Default	--big	--huge	--wolfgang
max_cites	--mcites	750	2000	5000	7500
max_ent_ints	--mentints	3000	4000	5000	7500
max_ent_strs	--mentstrs	3000	6000	10000	10000
max_fields	--mfields	17250	30000	85000	125000
max_strings	--mstrings	4000	10000	19000	30000
pool_size	--mpool	65530	130000	500000	750000
wiz_fn_space	--mwizfuns	3000	6000	10000	10000
hash_prime		4253	8501	16319	30011
hash_size		5000	10000	19000	35000

Table 2: Capacity and switches of `bibtex8`

2.4.2 BibTeX capacity issues

A venerable tool originally developed in the 1980s, BibTeX uses static memory allocation, much to the dismay of users working with large bibliographical databases. With a large `bib` file which contains several hundred entries, BibTeX is very likely to run out of memory. The number of entries it can cope with depends on the number of fields defined by the BibTeX style (`bst`). Style files which define a considerable number of fields, such as `biblatex.bst`, are more likely to trigger such problems. Unfortunately, traditional BibTeX does not output a clear error message when it runs out of memory but exposes a rather cryptical kind of faulty behavior. The warning messages printed in this case look like this:

```
Warning--I'm ignoring Jones1995's extra "year" field
--line 422 of file huge.bib
Warning--I'm ignoring Jones1995's extra "volume" field
--line 423 of file huge.bib
```

These warning messages could indeed indicate that the entry `Jones1995` is faulty because it includes two `year` and two `volume` fields. If that is not the case and the `bib` file is fairly large, this is most likely a capacity issue. What makes these warnings so confusing is that they are not tied to a specific entry. If you remove the allegedly faulty entry, a different one will trigger similar warnings. This is one reason why switching to `bibtex8`, the 8-bit implementation of BibTeX, is advisable. Alas, `bibtex8` is a venerable tool as well and will also run out of memory with its default capacity. Switching from traditional BibTeX to `bibtex8` is still an improvement because the capacity of the latter may be increased at run-time via command-line switches and it also prints unambiguous error messages, for example:

```
17289 fields:
Sorry---you've exceeded BibTeX's total number of fields 17250
```

Table 2 gives an overview of the various capacity parameters of `bibtex8` and the command-line switches used to increase their default values. There are two ways to increase the capacity on the command-line. You may use a high-level switch like `--huge` to select a different set of defaults or low-level switches such as `--mfields` to modify a single parameter. The first thing you should always do is run `bibtex8` with the `--wolfgang` switch. Don't even bother trying anything else.

With a very large database, however, even that capacity may be too small. In this case, you need to resort to the low-level switches. Here is an example of a set of switches which should cope with a bib file containing about 1000 entries:

```
bibtex8 --wolfgang --mcites 30000 --mentints 30000 --mentstrs 40000
--mfields 250000 --mstrings 35000 --mpool 750000 --csfile csfile.csf
auxfile
```

When taking a closer look at table 2, you will notice that there are two parameters which can not be modified directly, `hash_prime` and `hash_size`. Increasing these values is only possible with the high-level switches. That is why the above command includes the `--wolfgang` switch in addition to the low-level switches. This situation is very unfortunate because the hash size effectively sets a cap on some other parameters. For example, `max_strings` can not be greater than `hash_size`. If you hit this cap, all you can do is recompile `bibtex8` with a larger capacity. Also note that the `wiz_fn_space` parameter is not related to the bib file but to the memory requirements of the bst file. `biblatex.bst` needs a value of about 6000. The value 10000 implicitly used by the `--wolfgang` switch is fine.

2.4.3 BibTeX sorting and encoding issues

Traditional BibTeX can only alphabetize Ascii characters correctly. If the bibliographic data includes non-Ascii characters, they have to be given in Ascii notation. For example, instead of typing a letter like ‘ä’ directly, you need to input it as `\"a`, using an accent command and the Ascii letter. This Ascii notation needs to be wrapped in a pair of curly braces. Traditional BibTeX will then ignore the accent and use the Ascii letter for sorting. Here are a few examples:

```
author    = {S{\'a}nchez, Jos{\'e}},
editor    = {Ma{\ss}mann, R{\\"u}diger},
translator = {Ferdin{\`e}re, Fr{\c{c}}ois},
title     = {\O{E}uvres compl{\`e}tes},
```

Apart from it being inconvenient, there are two major issues with this convention. One subtle problem is that the extra set of braces suppresses the kerning on both sides of all non-Ascii letters. But first and foremost, simply ignoring all accents is often not the correct way to handle them. For example, in German the letter ‘ä’ is alphabetized in-between ‘a’ and ‘b’. Traditional BibTeX will treat it like an ‘a’. In Danish, the letter ‘å’ is the very last letter of the alphabet, so it should be alphabetized after ‘z’. BibTeX will sort it like an ‘a’. The ‘æ’ ligature and the letter ‘ø’ are also sorted after ‘z’ in this language. There are similar cases in Norwegian. In Swedish, the letter ‘ö’ is the very last letter of the alphabet and the letters ‘å’ and ‘ä’ are also alphabetized after ‘z’, rather than like an ‘a’.

What’s more, even the sorting of Ascii characters is done in a rather peculiar way by traditional BibTeX because the sorting algorithm uses Ascii codepage order (0-9,A-Z,a-z). This implies that the lowercase letter ‘a’ would end up after the uppercase ‘Z’, which is not even acceptable in the language BibTeX was originally designed for. The traditional bst files work around this problem by converting all strings used for sorting to lowercase, i. e., sorting is effectively case-insensitive.

These are the major reasons why switching to `bibtex8`, the 8-bit implementation of BibTeX, is advisable. `bibtex8` can sort in a case-sensitive way and it can handle (single byte) non-Ascii characters properly, provided that you supply it with a suitable `csf` file and give the `--csfile` switch on the command line. This also implies that it is possible to apply language-specific sorting rules to the bibliography. The `biblatex` package comes with `csf` files for some common Western European encodings. `bibtex8` also ships with a few `csf` files. Note that `biblatex.bst` can not detect if it is running under traditional BibTeX or `bibtex8`, hence the `bibtex8` package option. By default, sorting is case-insensitive since this is required for traditional BibTeX. If the `bibtex8` package option is enabled, sorting is case-sensitive.

Since `bibtex8` is backwards compatible with traditional BibTeX, it is possible to mix 8-bit input and Ascii notation. This is useful if the encoding used in the `bib` file does not cover all required characters. There are also a few marginal cases in which the Ascii notation scheme would yield better sorting results. A typical example is the ligature ‘œ’. `bibtex8` will handle this ligature like a single character. Depending on the sorting scheme defined in the `csf` file, it could be treated like an ‘o’ or alphabetized after the letter ‘o’ but it can not be sorted as ‘oe’. The Ascii notation (`\oe`) is equivalent to ‘oe’ during sorting:

```
title      = {\Euvres complètes},
title      = {\OE}uvres complètes},
```

Sometimes, even that is not sufficient and further tricks are required. The letter ‘ß’ in German is particularly tricky. This letter is essentially alphabetized as ‘ss’ but after ‘ss’. For example, a name like ‘Baßmann’ would be alphabetized as follows: Basmann, Bassmann, *Baßmann*, Bastmann. In this case, the Ascii notation (`\ss`) would yield slightly better sorting results than ‘ß’ in conjunction with a `csf` file which treats ‘ß’ like ‘s’. To get it absolutely right, however, you need to resort to the `sortname` field:

```
author     = {Baßmann, Paul},
sortname   = {Basszzmann, Paul},
```

Not only BibTeX, TeX needs to know about the encoding as well. When using non-Ascii characters in a `bib` file, load the `inputenc` package and specify the encoding as usual. The `biblatex` package is also capable of handling conflicting encodings in `tex` and `bib` files, provided that you specify the encoding of the `bib` file with the `bibencoding` package option. Here are a few typical cases along with the relevant lines from the document preamble:

- Ascii notation in both the `tex` and the `bib` file:


```
\usepackage{biblatex}
```
- Latin I encoding (ISO-8859-1) in the `tex` file, Ascii notation in the `bib` file:


```
\usepackage[latin1]{inputenc}
\usepackage{biblatex}
```
- Latin 9 encoding (ISO-8859-15) in both the `tex` and the `bib` file:

```
\usepackage[latin9]{inputenc}
\usepackage[bibencoding=inputenc]{biblatex}
```

- UTF-8 encoding in the tex file, Latin 1 (ISO-8859-1) in the bib file:

```
\usepackage[utf8]{inputenc}
\usepackage[bibencoding=latin1]{biblatex}
```

- Using UTF-8 encoding in both the tex and the bib file is not possible since neither traditional BibTeX nor bibtex8 can handle multi-byte encodings such as UTF-8. In this case, you need to use a single-byte encoding such as Latin 1 (see above) or resort to Ascii notation in the bib file:

```
\usepackage[utf8]{inputenc}
\usepackage{biblatex}
```

When using a non-Ascii encoding in the bib file, it is important to understand what biblatex can do for you and what requires manual intervention. The package takes care of the LaTeX side, i. e., it ensures that the bibliographic data is interpreted correctly as it is imported from the bbl file, provided that the bibencoding package option is set properly and the inputenc package is available. However, the BibTeX side demands attention, too. As mentioned above, you have to use bibtex8 and you need to supply it with a matching csf file. BibTeX needs to know about the encoding of the bib file to be able to alphabetize the entries correctly. Unfortunately, there is no way for biblatex to pass this information to bibtex8 automatically. The only way is setting the `--csfile` switch on the command line when executing bibtex8.

2.4.4 Editors and compiler scripts

As outlined in section 3.10.1, this package normally requires two LaTeX runs and one BibTeX run to incorporate a new reference. If the document contains any refsection environments or the xref field is used, additional BibTeX runs are required. In order to inform users which steps need to be taken, this package writes human-readable messages to the transcript file. These messages are discussed in section 3.10.2. In addition to that, it also outputs requests intended for LaTeX editors and compiler scripts which parse the transcript file to find out whether a BibTeX run and/or an additional LaTeX run is required.¹ The remainder of this section discusses the format of such requests. It is primarily relevant to readers interested in adding dedicated biblatex support to an editor or a compiler script.

All requests are made in a generic format suitable for adoption by other LaTeX packages which also need to communicate with external tools. Request always start with the string `REQ:` and end with `:REQ`. There are two sub-formats, a terse one and a verbose one. Terse requests are given on one line and consist of two

¹ Apart from that, biblatex outputs the usual warnings traditionally issued by LaTeX, such as “Citation ... undefined” or “There were undefined references”. LaTeX editors and compiler scripts which do not explicitly support this package should therefore work reasonably well as long as biblatex only uses the main aux file. However, if the document contains any refsection environments, which require additional aux files, dedicated biblatex support is indispensable.

columns separated by a colon. The first column is the priority of the request, the second column indicates the application to be run. The application is identified by its generic name, for example `latex` rather than `pdfelatex`.

```
REQ:priority:application:REQ
```

Verbose requests span multiple lines. The first line is similar to terse requests and indicates the priority and the generic name of the requested application. The part which differs from terse requests consists of lines which start with a keyword followed by an equal sign. The remaining part of the line is a value assigned to the keyword.

```
REQ:priority:application:  
binary=binary  
option=option  
infile=infile  
:REQ
```

Whenever this package requests a BibTeX run it will also request an additional LaTeX run, but not vice versa. LaTeX requests use the terse format, BibTeX requests require the verbose one. This package uses three different keywords in BibTeX requests. The `binary` keyword indicates the name of the requested binary. This may be different from the generic name. The `option` keyword indicates a command-line option to be passed to the binary. This keyword may occur zero or multiple times. The `infile` keyword indicates the name of the aux file without the file suffix. As an example, consider a LaTeX file named `example.tex` with some citations and a bibliography. In this case, the following requests are written to the console and the transcript file:

```
REQ:2:bibtex:  
binary=bibtex  
infile=example  
:REQ
```

```
REQ:1:latex:REQ
```

As the priority indicates, BibTeX should be run first and LaTeX afterwards (a higher number indicates a higher priority). Now consider a source file named `example.tex` with two `refsection` environments:

```
REQ:2:bibtex:  
binary=bibtex  
infile=example1-blx  
:REQ
```

```
REQ:2:bibtex:  
binary=bibtex  
infile=example2-blx  
:REQ
```

```
REQ:1:latex:REQ
```

Note that the package options discussed in section 3.1.3 affect the format of all

BibTeX requests. For example, setting `mincrossrefs=5` yields the following options:

```
binary=bibtex
option=--min-crossrefs=5
```

The backend option affects the name of the requested binary and the format of the command-line arguments. For example, the package options `backend=bibtex8`, `mincrossrefs=5`, and `bibencoding=latin9` yield the following options:

```
binary=bibtex8
option=--min_crossrefs 5
option=--csfile latin9.csf
```

When parsing the values assigned to keys like `option` and `infile`, keep in mind that they are terminated by the end of the line. In theory, they may contain any Ascii character except newline and carriage return.

3 User guide

This part of the manual documents the user interface of the `biblatex` package. The user guide covers everything you need to know in order to use `biblatex` with the default styles that come with this package. You should read the user guide first in any case. If you want to write your own citation and/or bibliography styles, continue with the author guide afterwards.

3.1 Package options

All package options are given in $\langle key \rangle = \langle value \rangle$ notation. The value `true` is omissible with all boolean keys. For example, giving `sortcites` without a value is equivalent to `sortcites=true`.

3.1.1 Load-time options

The following options must be used as `biblatex` is loaded, i.e., in the optional argument to `\usepackage`.

`style=⟨file⟩` default: numeric

Loads the bibliography style `file.bbx` and the citation style `file.cbx`. See sections 3.3 for an overview of the standard styles.

`bibstyle=⟨file⟩` default: numeric

Loads the bibliography style `file.bbx`. See section 3.3.2 for an overview of the standard bibliography styles.

`citestyle=⟨file⟩` default: numeric

Loads the citation style `file.cbx`. See section 3.3.1 for an overview of the standard citation styles.

`natbib=true, false` default: false

Loads a compatibility style for the `natbib` package in addition to the main citation

style. The compatibility style defines aliases for the citation commands provided by the natbib package. See section 3.6.9 for details.

3.1.2 Preamble options

The following options may be used in the optional argument to `\usepackage` as well as in the configuration file and the document preamble. The default value listed to the right is the package default. Note that bibliography and citation styles may modify the default setting at load time, see section 3.3 for details.

`sorting`=nty, nyt, nyvt, anyt, anyvt, ynt, ydnt, debug, none default: nty

The sorting order of the bibliography. Unless stated otherwise, the entries are sorted in ascending order. The following choices are available:

nty	Sort by name, title, year.
nyt	Sort by name, year, title.
nyvt	Sort by name, year, volume, title.
anyt	Sort by alphabetic label, name, year, title.
anyvt	Sort by alphabetic label, name, year, volume, title.
ynt	Sort by year, name, title.
ydnt	Sort by year (descending), name, title.
debug	Sort by entry key. This is intended for debugging only.
none	Do not sort at all. All entries are processed in citation order.

Please refer to section 3.4 for an in-depth explanation of the above sorting options as well as the fields considered in the sorting process. Using any of the ‘alphabetic’ sorting orders only makes sense in conjunction with a bibliography style which actually prints the corresponding labels. Note that some bibliography styles initialize this package option to a value different from the package default (nty). See section 3.3.2 for details.

`sortlos`=bib, los default: los

The sorting order of the list of shorthands. The following choices are available:

bib	Sort according to the sorting order of the bibliography.
los	Sort by shorthand.

`sortcites`=true, false default: false

Whether to sort the labels if multiple entry keys are passed to a citation command. If this option is enabled, names and labels are sorted according to the sorting order of the bibliography. This feature works with all citation styles.

`maxnames`=*<integer>* default: 3

A threshold affecting all lists of names (author, editor, etc.). If a list exceeds this threshold, i. e., if it contains more than *<integer>* names, it is automatically truncated according to the setting of the minnames package option.

`minnames`= $\langle integer \rangle$ default: 1

A limit affecting all lists of names (author, editor, etc.). If a list contains more than $\langle maxnames \rangle$ names, it is automatically truncated to $\langle minnames \rangle$ names in citations and in the bibliography. This also affects the sorting of the bibliography and the generation of labels. The value of $\langle minnames \rangle$ must be smaller than or equal to $\langle maxnames \rangle$.

`maxitems`= $\langle integer \rangle$ default: 3

Similar to `maxnames`, but affecting all literal lists (publisher, location, etc.).

`minitems`= $\langle integer \rangle$ default: 1

Similar to `minnames`, but affecting all literal lists (publisher, location, etc.).

`autocite`=plain, inline, footnote, superscript, ...

This option controls the behavior of the `\autocite` command discussed in section 3.6.4 below. The `plain` option makes `\autocite` behave like `\cite`, `inline` makes it behave like `\parencite`, `footnote` makes it behave like `\footcite`, and `superscript` makes it behave like `\supercite`. The options `plain`, `inline`, and `footnote` are always available, the `superscript` option is only provided by the numeric citation styles which come with this package. The citation style may also define additional options. The default setting of this option depends on the selected citation style, see section 3.3.1.

`autopunct`=true, false default: true

This option controls whether the citation commands scan ahead for punctuation marks. See section 3.6 and `\DeclareAutoPunctuation` in section 4.6.5 for details.

`babel`=none, hyphen, other, other* default: none

This option controls which language environment is used if the `babel` package is loaded and a bibliography entry includes a `hyphenation` field (see section 2.2.3). Note that `biblatex` automatically adjusts to the main document language if `babel` is loaded. In multilingual documents, it will also continually adjust to the current language as far as citations and the default language of the bibliography is concerned. This option is for switching languages on a per-entry basis within the bibliography. The possible choices are:

none	Disable this feature, i. e., do not use any language environment at all.
hyphen	Enclose the entry in a <code>hyphenrules</code> environment. This will load hyphenation patterns for the language specified in the <code>hyphenation</code> field of the entry, if available.
other	Enclose the entry in an <code>otherlanguage</code> environment. This will load hyphenation patterns for the specified language, enable all extra definitions which <code>babel</code> and <code>biblatex</code> provide for the respective language, and translate key terms such as ‘editor’ and ‘volume’. The extra definitions include localizations of the date format, of ordinals, and similar things.

`other*` Enclose the entry in an `otherlanguage*` environment. This is similar to `otherlanguage` except that the translations are not used.

`block=none, space, par, npar, ragged` default: none

This option controls the extra spacing between blocks, i. e., larger segments of a bibliography entry. The possible choices are:

<code>none</code>	Do not add anything at all.
<code>space</code>	Insert additional horizontal space between blocks. This is similar to the default behavior of the standard LaTeX document classes.
<code>par</code>	Start a new paragraph for every block. This is similar to the <code>openbib</code> option of the standard LaTeX document classes.
<code>npar</code>	Similar to the <code>par</code> option, but disallows page breaks at block boundaries and within an entry.
<code>ragged</code>	Inserts a small negative penalty to encourage line breaks at block boundaries and sets the bibliography ragged right.

The `\newblockpunct` command may also be redefined directly to achieve different results, see section 3.8.I. Also see section 4.6.I for additional information.

`hyperref=true, false, auto` default: false

Whether to transform citations and back references into clickable hyperlinks. This feature requires the `hyperref` package. It also requires support by the selected citation style. All standard styles which ship with this package support hyperlinks. `hyperref=auto` automatically detects if the `hyperref` package has been loaded.

`backref=true, false` default: false

Whether to print back references in the bibliography. The back references are a list of page numbers indicating the pages on which the respective bibliography entry is cited. If there are `refsection` environments in the document, the back references are local to the reference sections. Strictly speaking, this option only controls whether the `biblatex` package collects the data required to print such references. This feature still has to be supported by the selected bibliography style. All standard styles which ship with this package do so.

`indexing=true, false, cite, bib` default: false

This option controls indexing in citations and in the bibliography. The possible choices are:

<code>true</code>	Enable indexing globally.
<code>false</code>	Disable indexing globally.
<code>cite</code>	Enable indexing in citations only.
<code>bib</code>	Enable indexing in the bibliography only.

This feature requires support by the selected citation style. All standard styles which ship with this package support indexing of both citations and entries in the bibliography. Note that you still need to enable indexing globally with `\makeindex` to get an index.

`loadfiles=true, false` default: false

This option controls whether external files requested by way of the `\printfile` command are loaded. See also section 3.10.7 and `\printfile` in section 4.4.1. Note that this feature is disabled by default for performance reasons.

`refsection=none, part, chapter, section, subsection` default: none

This option automatically starts a new reference section at a document division such as a chapter or a section. This is equivalent to a `\newrefsection` command, see section 3.5.3 for details. The following choice of document divisions is available:

<code>none</code>	Disable this feature.
<code>part</code>	Start a reference section at every <code>\part</code> command.
<code>chapter</code>	Start a reference section at every <code>\chapter</code> command.
<code>section</code>	Start a reference section at every <code>\section</code> command.
<code>subsection</code>	Start a reference section at every <code>\subsection</code> command.

`refsegment=none, part, chapter, section, subsection` default: none

Similar to the `refsection` option but starts a new reference segment. This is equivalent to a `\newrefsegment` command, see section 3.5.4 for details. When using both options, note that you can only apply this option to a lower-level document division than the one `refsection` is applied to and that nested reference segments will be local to the enclosing reference section.

`citereset=none, part, chapter, section, subsection` default: none

This option automatically executes the `\citereset` command from section 3.6.8 at a document division such as a chapter or a section. The following choice of document divisions is available:

<code>none</code>	Disable this feature.
<code>part</code>	Perform a reset at every <code>\part</code> command.
<code>chapter</code>	Perform a reset at every <code>\chapter</code> command.
<code>section</code>	Perform a reset at every <code>\section</code> command.
<code>subsection</code>	Perform a reset at every <code>\subsection</code> command.

`abbreviate=true, false` default: true

Whether to use long or abbreviated strings in citations and in the bibliography. This option affects the localization modules. If this option is enabled, key terms such as ‘editor’ are abbreviated. If not, they are written out.

`date=short, long` default: long

Whether to use a short or long format for date specifications. Since the month name of the long format is responsive to the `abbreviate` package option, there are in fact three formats to choose from. The actual format is language-dependent. With the American localization module, for example, the date is printed as

'12/31/2007' or 'December 31, 2007' ('Dec. 31, 2007' if the `abbreviate` option is enabled).

`urldate=short, long` default: short

Whether to use a short or long format for URL date specifications. This option is similar to `date` except that it controls the format used for the retrieval date of an internet address.

`defernums=true, false` default: false

In contrast to standard LaTeX, the numeric labels generated by this package are normally assigned to the full list of references at the beginning of the document body. If this option is enabled, numeric labels (i. e., the `labelnumber` field discussed in section 4.2.4) are assigned the first time an entry is printed in any bibliography. See section 3.11.4 for further explanation.

`punctfont=true, false` default: false

This option enables an alternative mechanism for dealing with unit punctuation after a field printed in a different font (for example, a title printed in italics). See `\setpunctfont` in section 4.6.1 for details.

`arxiv=abs, ps, pdf, format` default: abs

Path selector for arXiv links. If hyperlink support is enabled, this option controls which version of the document arXiv eprint links will point to. The following choices are available:

<code>abs</code>	Link to the abstract page.
<code>ps</code>	Link to the PostScript version.
<code>pdf</code>	Link to the PDF version.
<code>format</code>	Link to the format selector.

See section 3.10.6 for details on support for arXiv and electronic publishing information.

3.1.3 Advanced options

Technically, the following options are preamble options like the ones in section 3.1.2.

`backend=bibtex, bibtex8` default: bibtex

Specifies the BibTeX binary used as database backend. The following backends are supported:

<code>bibtex</code>	Legacy BibTeX. This setting affects the sorting process. With <code>backend=bibtex</code> , sorting is case-insensitive.
<code>bibtex8</code>	<code>bibtex8</code> , the 8-bit implementation of BibTeX. This setting also affects the sorting process. With <code>backend=bibtex8</code> , sorting is case-sensitive.

This option will typically be set permanently in the configuration file, see section

3.2 for details. Also see section 2.4.3 for further instructions concerning the encoding of bib files.

`mincrossrefs`= $\langle integer \rangle$ default: 2

Sets the minimum number of cross references to $\langle integer \rangle$ when requesting a BibTeX run.¹ Note that this package option merely affects the format of certain requests written to the transcript file. It will not have any effect if the editor or compiler script launching BibTeX does not include dedicated `biblatex` support or if BibTeX is manually launched from the command-line.² See section 2.4.4 for details. This option also affects the handling of the `xref` field. See the field description in section 2.2.3 as well as section 2.4.1 for details.

`bibencoding`=`ascii`, `inputenc`, $\langle encoding \rangle$ default: `ascii`

If the bib file is not an Ascii file, use this option to specify its encoding. The following choices are available:

<code>ascii</code>	Assume Ascii encoding. This option disables the encoding feature.
<code>inputenc</code>	Get the encoding from the <code>inputenc</code> package. Use this option if the encoding of the bib file is identical to the one of the LaTeX file.
$\langle encoding \rangle$	If the encoding of the bib file is different from the one of the LaTeX file, you need to specify it explicitly. The $\langle encoding \rangle$ must be an encoding name known to the <code>inputenc</code> package, i. e., there must be a matching <code>encoding.def</code> file. If this option is used, all macros used in the bib file must be robust or explicitly prefixed with <code>\protect</code> . ³

Note that `bibencoding=inputenc` and `bibencoding= $\langle encoding \rangle$` will implicitly set `backend=bibtex8` and report the encoding to external tools (see section 2.4.4). When using these options, you should provide a matching `encoding.csf` file for `bibtex8`. See section 2.4.3 for further instructions.

3.1.4 Entry options

Entry options are package options which can be adjusted on a per-entry basis in the options field from section 2.2.3.

Hybrid entry/preamble options

The following options are settable on a per-entry basis in the options field. In addition to that, they may also be used in the optional argument to `\usepackage`

¹ If an entry which is cross-referenced by other entries in the bib file hits this threshold, it is included in the bibliography even if it has not been cited explicitly. This is a standard feature of BibTeX and not specific to `biblatex`. See the description of the `crossref` field in section 2.2.3 for further information.

² As of this writing, no LaTeX editors or compiler scripts with dedicated `biblatex` support are known, but this will hopefully change in the future.

³ In order to support different encodings in `tex` and `bib` files, this package will preprocess all data in the bib file with the equivalent of a `\protected@edef`. This step is required to convert all 8-bit characters into encoding agnostic LaTeX internal character representations (LICRS).

as well as in the configuration file and the document preamble. This is useful if you want to change the default behavior globally.

`useauthor=true, false` default: true

Whether the author is used in labels and considered during sorting. This may be useful if an entry includes an `author` field but is usually not cited by author for some reason. Setting `useauthor=false` does not mean that the author is ignored completely. It means that the author is not used in labels and ignored during sorting. The entry will then be alphabetized by editor or title. With the standard styles, the author is printed after the title in this case. See also section 3.4.

`useeditor=true, false` default: true

Whether the editor replaces a missing author in labels and during sorting. This may be useful if an entry includes an `editor` field but is usually not cited by editor. Setting `useeditor=false` does not mean that the editor is ignored completely. It means that the editor does not replace a missing author in labels and during sorting. The entry will then be alphabetized by title. With the standard styles, the editor is printed after the title in this case. See also section 3.4.

`usetranslator=true, false` default: false

Whether the translator replaces a missing author/editor in labels and during sorting. Setting `usetranslator=true` does not mean that the translator overrides the author/editor. It means that the translator is considered as a fallback if the author/editor is missing or if `useauthor` and `useeditor` are set to false. In other words, in order to cite a book by translator rather than by author, you need to set the following options:

```
@Book{...,
  options    = {useauthor=false,usetranslator=true},
  author     = {...},
  translator = {...},
  ...
```

With the standard styles, the translator is printed after the title by default. See also section 3.4.

`useprefix=true, false` default: false

Whether the name prefix (von, van, of, da, de, della, etc.) is considered when printing the last name in citations. This also affects the sorting and formatting of the bibliography as well as the generation of certain types of labels. If this option is enabled, `biblatex` always precedes the last name with the prefix. For example, Ludwig van Beethoven would be cited as “Beethoven” and alphabetized as “Beethoven, Ludwig van” by default. If this option is enabled, he is cited as “van Beethoven” and alphabetized as “Van Beethoven, Ludwig” instead.

Dedicated entry options

The following options are only settable on a per-entry basis in the options field. They are not available globally.

`skipbib=true, false` default: false

If this option is enabled, the entry is excluded from the bibliography but it may still be cited.

`skiplos=true, false` default: false

If this option is enabled, the entry is excluded from the list of shorthands. It is still included in the bibliography and it may also be cited by shorthand.

`skiplab=true, false` default: false

If this option is enabled, `biblatex` will not assign any labels to the entry. This option is not required for normal operation. Use it with care. If enabled, `biblatex` can not guarantee unique citations for the respective entry and citations styles which require labels may fail to create valid citations for the entry.

`dataonly=true, false` default: false

Setting this option is similar to `skipbib`, `skiplos`, and `skiplab`. This option is not required for normal operation. Use it with care.

3.1.5 Internal options

The default settings of the following preamble options are controlled by bibliography and citation styles. Apart from the `pagetracker` and `firstinits` options, which you may want to adapt, there is normally no need to set them explicitly.

`pagetracker=true, false, page, spread` default: false

This option controls the page tracker which is required by the `\ifsamepage` and `\iffirstonpage` tests from section 4.5.2. The possible choices are:

<code>true</code>	Enable the tracker in automatic mode. This is like <code>spread</code> if LaTeX is in twoside mode, and like <code>page</code> otherwise.
<code>false</code>	Disable the tracker.
<code>page</code>	Enable the tracker in page mode. In this mode, tracking works on a per-page basis.
<code>spread</code>	Enable the tracker in spread mode. In this mode, tracking works on a per-spread (double page) basis.

Note that this tracker is disabled in all floats, see section 4.10.3.

`citetracker=true, false, context, strict, constrict` default: false

This option controls the citation tracker which is required by the `\ifciteseen` and `\ifentryseen` tests from section 4.5.2. The possible choices are:

<code>true</code>	Enable the tracker in global mode.
<code>false</code>	Disable the tracker.

- context Enable the tracker in context-sensitive mode. In this mode, citations in footnotes and in the body text are tracked independently.
- strict Enable the tracker in strict mode. In this mode, an item is only considered if it appeared in a stand-alone citation, i. e., if a single entry key was passed to the citation command.
- constrict Enable the tracker in context-sensitive strict mode. This mode combines the features of context and strict.

Note that this tracker is disabled in all floats, see section 4.10.3.

`ibidtracker=true, false, context, strict, constrict` default: false

This option controls the ‘ibidem’ tracker which is required by the `\ifciteibid` test from section 4.5.2. The possible choices are:

- true Enable the tracker in global mode.
- false Disable the tracker.
- context Enable the tracker in context-sensitive mode. In this mode, citations in footnotes and in the body text are tracked separately.
- strict Enable the tracker in strict mode. In this mode, potentially ambiguous references are suppressed. A reference is considered ambiguous if either the current citation (the one including the ‘ibidem’) or the previous citation (the one the ‘ibidem’ refers to) consists of a list of references.¹
- constrict Enable the tracker in context-sensitive strict mode. This mode combines the features of context and strict. It also keeps track of footnote numbers and detects potentially ambiguous references in footnotes in a stricter way than the strict option. In addition to the conditions imposed by the strict option, a reference in a footnote will only be considered as unambiguous if the current citation and the previous citation are given in the same footnote or in immediately consecutive footnotes.

Note that this tracker is disabled in all floats, see section 4.10.3.

`idemtracker=true, false, context, strict, constrict` default: false

This option controls the ‘idem’ tracker which is required by the `\ifciteidem` test from section 4.5.2. The possible choices are:

- true Enable the tracker in global mode.
- false Disable the tracker.
- context Enable the tracker in context-sensitive mode. In this mode, citations in footnotes and in the body text are tracked separately.
- strict Enable the tracker in strict mode. In this mode, potentially ambigu-

¹ For example, suppose the initial citation is “Jones, *Title*; Williams, *Title*” and the following one “ibidem”. From a technical point of view, it is fairly clear that the ‘ibidem’ refers to ‘Williams’ because this is the last reference processed by the previous citation command. To a human reader, however, this may not be obvious because the ‘ibidem’ may also refer to both titles. The strict mode avoids such ambiguous references.

ous references are suppressed. See the `ibidtracker=strict` option above for details.

`constrict` Enable the tracker in context-sensitive strict mode. This mode combines the features of `context` and `strict`. See the `ibidtracker=constrict` option above for details.

Note that this tracker is disabled in all floats, see section 4.10.3.

`opcittracker=true, false, context, strict, constrict` default: false

This option controls the ‘opcit’ tracker which is required by the `\ifopcit` test from section 4.5.2. This feature is similar to the ‘ibidem’ tracker except that it tracks citations on a per-author/editor basis, i. e., `\ifopcit` will yield `true` if the cited item is the same as the last one by this author or editor. The possible choices are:

`true` Enable the tracker in global mode.
`false` Disable the tracker.
`context` Enable the tracker in context-sensitive mode. In this mode, citations in footnotes and in the body text are tracked separately.
`strict` Enable the tracker in strict mode. In this mode, potentially ambiguous references are suppressed. See the `ibidtracker=strict` option above for details.
`constrict` Enable the tracker in context-sensitive strict mode. This mode combines the features of `context` and `strict`. See the `ibidtracker=constrict` option above for details.

Note that this tracker is disabled in all floats, see section 4.10.3.

`loccittracker=true, false, context, strict, constrict` default: false

This option controls the ‘loccit’ tracker which is required by the `\ifloccit` test from section 4.5.2. This feature is similar to the ‘opcit’ tracker except that it also checks whether the $\langle postnote \rangle$ arguments match, i. e., `\ifloccit` will yield `true` if the citation refers to the same page cited before. The possible choices are:

`true` Enable the tracker in global mode.
`false` Disable the tracker.
`context` Enable the tracker in context-sensitive mode. In this mode, citations in footnotes and in the body text are tracked separately.
`strict` Enable the tracker in strict mode. In this mode, potentially ambiguous references are suppressed. See the `ibidtracker=strict` option above for details. In addition to that, this mode also checks if the $\langle postnote \rangle$ argument is numerical (in the sense of `\ifnumerals` from section 4.5.2).
`constrict` Enable the tracker in context-sensitive strict mode. This mode combines the features of `context` and `strict`. See the `ibidtracker=constrict` option above for details. In addition to that, this mode also checks if the $\langle postnote \rangle$ argument is numerical (in the sense of `\ifnumerals` from section 4.5.2).

Note that this tracker is disabled in all floats, see section 4.10.3.

`firstinits=true, false` default: false

When enabled, all first and middle names will be rendered as initials. The option will affect the `\iffirstinits` test from section 4.5.2.

`terseinits=true, false` default: false

This option controls the format of all initials generated by `biblatex`. By default, `biblatex` adds a dot after an initial. If this option is enabled, it uses a terse format without dots and spaces. For example, the initials of Donald Ervin Knuth would be rendered as ‘D. E.’ by default, and as ‘DE’ if this option is enabled. This terse format is required by some citation schemes.

`labelalpha=true, false` default: false

Whether to provide the special fields `labelalpha` and `extraalpha`, see section 4.2.4 for details.

`labelnumber=true, false` default: false

Whether to provide the special field `labelnumber`, see section 4.2.4 for details.

`labelyear=true, false` default: false

Whether to provide the special field `labelyear`, see section 4.2.4 for details.

`singletitle=true, false` default: false

Whether to provide the data required by the `\ifsingletitle` test, see section 4.5.2 for details.

`uniquename=true, false, init` default: false

Whether to set the `uniquename` counter, see section 4.5.2 for details. This feature is useful in citation styles which add initials or other parts of the name when citing different authors with the same last name. If the citation style uses initials to disambiguate names but never prints the full name in citations, set the option to `init` rather than `true`. This difference is crucial because the state of this option will also affect the `\ifsingletitle` test and the `labelyear` field. Do not set the option to `true` in citation styles which only print initials to disambiguate names.

3.1.6 Legacy options

The following legacy option may be used globally in the optional argument to `\documentclass` or locally in the optional argument to `\usepackage`:

`openbib` This option is provided for backwards compatibility with the standard LaTeX document classes. `openbib` is similar to `block=par`.

3.2 Global customization

Apart from writing new citation and bibliography styles, there are numerous ways to customize the styles which ship with this package. Customization will usually

take place in the preamble, but there is also a configuration file for permanent adaptations. The configuration file may also be used to initialize the package options to a value different from the package default.

3.2.1 Configuration file

If available, this package will load the configuration file `biblatex.cfg`. This file is read at the end of the package, immediately after the citation and bibliography styles have been loaded.

3.2.2 Executing package options

The load-time package options in section 3.1.1 must be given in the optional argument to `\usepackage`. All package options in sections 3.1.2–3.1.5, however, may also be given in the preamble. The options are executed with the following command:

```
\ExecuteBibliographyOptions{<key=value, ...>}
```

This command may also be used in the configuration file to modify the default setting of a package option.

3.3 Standard styles

This section provides a short description of all bibliography and citation styles which ship with the `biblatex` package. If you want to write your own styles, see section 4.

3.3.1 Citation styles

The citation styles which come with this package implement several common citation schemes. All standard styles cater for the shorthand field and support hyperlinks as well as indexing.

numeric This style implements a numeric citation scheme similar to the standard bibliographic facilities of LaTeX. It should be employed in conjunction with a numeric bibliography style which prints the corresponding labels in the bibliography. It is intended for in-text citations. The style will set the following package options at load time: `autocite=inline`, `labelnumber=true`. This style also provides an additional preamble option called `subentry` which affects the handling of reference sets. If this option is disabled, citations referring to a member of a set will point to the entire set. If it is enabled, the style supports citations like “[5c]” which point to a subentry in a set (the third one in this example). The option defaults to `false`. See the style example for details.

numeric-comp A compact variant of the `numeric` style which prints a list of more than two consecutive numbers as a range. This style is similar to the `cite` package and the `sort&compress` option of the `natbib` package in numerical mode. For example, instead of “[8, 3, 1, 7, 2]” this style would print “[1–3, 7, 8]”. It is intended for in-text citations. The style will set the following package options at load time: `autocite=inline`, `sortcites=true`, `labelnumber=true`. It also provides the `subentry` option.

- numeric-verb** A verbose variant of the numeric style. The difference affects the handling of a list of citations and is only apparent when multiple entry keys are passed to a single citation command. For example, instead of “[2, 5, 6]” this style would print “[2]; [5]; [6]”. It is intended for in-text citations. The style will set the following package options at load time: `autocite=inline`, `labelnumber=true`. It also provides the `subentry` option.
- alphabetic** This style implements an alphabetic citation scheme similar to the `alpha.bst` style of traditional BibTeX. The alphabetic labels resemble a compact author-year style to some extent, but the way they are employed is similar to a numeric citation scheme. For example, instead of “Jones 1995” this style would use the label “[Jon95]”. “Jones and Williams 1986” would be rendered as “[JW86]”. This style should be employed in conjunction with an alphabetic bibliography style which prints the corresponding labels in the bibliography. It is intended for in-text citations. The style will set the following package options at load time: `autocite=inline`, `labelalpha=true`.
- alphabetic-verb** A verbose variant of the alphabetic style. The difference affects the handling of a list of citations and is only apparent when multiple entry keys are passed to a single citation command. For example, instead of “[Doe92; Doe95; Jon98]” this style would print “[Doe92]; [Doe95]; [Jon98]”. It is intended for in-text citations. The style will set the following package options at load time: `autocite=inline`, `labelalpha=true`.
- authoryear** This style implements an author-year citation scheme. If the bibliography contains two or more works by the same author which were all published in the same year, a letter is appended to the year. For example, this style would print citations such as “Doe 1995a; Doe 1995b; Jones 1998”. This style should be employed in conjunction with an author-year bibliography style which prints the corresponding labels in the bibliography. It is primarily intended for in-text citations, but it could also be used with citations given in footnotes. The style will set the following package options at load time: `autocite=inline`, `labelyear=true`, `uniquename=true`.
- authoryear-comp** A compact variant of the authoryear style which prints the author only once if subsequent references passed to a single citation command share the same author. If they share the same year as well, the year is also printed only once. For example, instead of “Doe 1995b; Doe 1992; Jones 1998; Doe 1995a” this style would print “Doe 1992, 1995a,b; Jones 1998”. It is primarily intended for in-text citations, but it could also be used with citations given in footnotes. The style will set the following package options at load time: `autocite=inline`, `sortcites=true`, `labelyear=true`, `uniquename=true`.
- authoryear-ibid** A variant of the authoryear style which replaces repeated citations by the abbreviation *ibidem* unless the citation is the first one on the current page or double-page spread, or the *ibidem* would be ambiguous in the sense of the package option `ibidtracker=constrict`. The style will set the following package options at load time: `autocite=inline`, `labelyear=true`, `uniquename=true`, `ibidtracker=`

constrict, pagetracker=true. This style also provides an additional preamble option called `ibidpage` which defaults to `false`. See the style example for details.

- authortitle** This style implements a simple author-title citation scheme. It will make use of the `shorttitle` field, if available. It is intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`.
- authortitle-comp** A compact variant of the `authortitle` style which prints the author only once if subsequent references passed to a single citation command share the same author. For example, instead of “Doe, *First title*; Doe, *Second title*” this style would print “Doe, *First title, Second title*”. It is intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`, `sortcites=true`.
- authortitle-ibid** A variant of the `authortitle` style which replaces repeated citations by the abbreviation *ibidem* unless the citation is the first one on the current page or double-page spread, or the *ibidem* would be ambiguous in the sense of the package option `ibidtracker=constrict`. It is intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`, `ibidtracker=constrict`, `pagetracker=true`. This style also provides an additional preamble option called `ibidpage` which defaults to `false`. See the style example for details.
- authortitle-icomp** A style combining the features of `authortitle-comp` and `authortitle-ibid`. The style will set the following package options at load time: `autocite=footnote`, `ibidtracker=constrict`, `pagetracker=true`, `sortcites=true`. This style also provides an additional preamble option called `ibidpage` which defaults to `false`. See the style example for details.
- authortitle-terse** A terse variant of the `authortitle` style which only prints the title if the bibliography contains more than one work by the respective author or editor. This style will make use of the `shorttitle` field, if available. It is suitable for in-text citations as well as citations given in footnotes. The style will set the following package options at load time: `autocite=inline`, `singletitle=true`, `uniquename=true`.
- authortitle-tcomp** A style combining the features of `authortitle-comp` and `authortitle-terse`. This style will make use of the `shorttitle` field, if available. It is suitable for in-text citations as well as citations given in footnotes. The style will set the following package options at load time: `autocite=inline`, `sortcites=true`, `singletitle=true`, `uniquename=true`.
- verbose** A verbose citation style which prints a full citation similar to a bibliography entry when an entry is cited for the first time, and a short citation afterwards. If available, the `shorttitle` field is used in all short citations. If the `shorthand` field is defined, the shorthand is introduced on the first citation and used as the short citation thereafter. This style may be used without a list of references and shorthands since all bibliographic data is provided on the first citation. It is intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`, `citetracker=context`.

- verbose-ibid** A variant of the verbose style which replaces repeated citations by the abbreviation *ibidem* unless the citation is the first one on the current page or double-page spread, or the *ibidem* would be ambiguous in the sense of `ibidtracker=strict`. This style is intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`, `citetracker=context`, `ibidtracker=constrict`, `pagetracker=true`. This style also provides an additional preamble option called `ibidpage` which defaults to `false`. See the style example for details.
- verbose-note** This style is similar to the verbose style in that it prints a full citation similar to a bibliography entry when an entry is cited for the first time, and a short citation afterwards. In contrast to the verbose style, the short citation is a pointer to the footnote with the full citation. If the bibliography contains more than one work by the respective author or editor, the pointer also includes the title. If available, the `shorttitle` field is used in all short citations. If the `shorthand` field is defined, it is handled as with the verbose style. This style may be used without a list of references and shorthands since all bibliographic data is provided on the first citation. It is exclusively intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`, `citetracker=context`, `singletitle=true`. This style also provides an additional preamble option called `pageref` which adds the page to the footnote number pointing to the full citation if it is located on a different page. This option defaults to `false`. See the style example for details.
- verbose-inote** A variant of the verbose-note style which replaces repeated citations by the abbreviation *ibidem* unless the citation is the first one on the current page or double-page spread, or the *ibidem* would be ambiguous in the sense of `ibidtracker=strict`. This style is exclusively intended for citations given in footnotes. It will set the following package options at load time: `autocite=footnote`, `citetracker=context`, `ibidtracker=constrict`, `singletitle=true`, `pagetracker=true`. This style also provides two additional preamble options called `ibidpage` and `pageref`. Both options default to `false`. See the style example for details.
- verbose-trad1** This style implements a traditional citation scheme. It is similar to the verbose style in that it prints a full citation similar to a bibliography entry when an item is cited for the first time, and a short citation afterwards. Apart from that, it uses the scholarly abbreviations *ibidem*, *idem*, *op. cit.*, and *loc. cit.* to replace recurrent authors, titles, and page numbers in repeated citations in a special way. If the `shorthand` field is defined, the shorthand is introduced on the first citation and used as the short citation thereafter. This style may be used without a list of references and shorthands since all bibliographic data is provided on the first citation. It is intended for citations given in footnotes. The style will set the following package options at load time: `autocite=footnote`, `citetracker=context`, `ibidtracker=constrict`, `idemtracker=constrict`, `opcitracker=context`, `locctracker=context`. This style also provides two additional preamble options called `ibidpage` and `strict`. Both options default to `false`. See the style example for details.
- verbose-trad2** Another traditional citation scheme. It is also similar to the verbose style but uses

scholarly abbreviations like *ibidem* and *idem* in repeated citations. In contrast to the `verbose-trad1` style, the logic of the *op. cit.* abbreviations is different in this style and *loc. cit.* is not used at all. It is in fact more similar to `verbose-ibid` and `verbose-inote` than to `verbose-trad1`. The style will set the following package options at load time: `autocite=footnote`, `citetracker=context`, `ibidtracker=constrict`, `idemtracker=constrict`, `singletitle=true`. This style also provides two additional preamble options called `ibidpage` and `strict`. Both options default to `false`. See the style example for details.

reading A citation style which goes with the bibliography style by the same name. It simply loads the `authortitle` style.

The following citation styles are special purpose styles. They are not intended for the final version of a document:

draft A draft style which uses the entry keys in citations. The style will set the following package options at load time: `autocite=plain`.

debug This style prints the entry key rather than some kind of label. It is intended for debugging only and will set the following package options at load time: `autocite=plain`.

3.3.2 Bibliography styles

All bibliography styles which come with this package use the same basic format for the individual bibliography entries. They only differ in the kind of label printed in the bibliography and the overall formatting of the list of references. There is a matching bibliography style for every citation style. Note that some bibliography styles are not mentioned below because they simply load a more generic style. For example, the bibliography style `authortitle-terse` will load the `authortitle` style. These aliases are provided for convenience only.

numeric This style prints a numeric label similar to the standard bibliographic facilities of LaTeX. It is intended for use in conjunction with a numeric citation style. Note that the `shorthand` field overrides the default label. The style will set the following package options at load time: `labelnumber=true`. This style also provides an additional preamble option called `subentry` which affects the formatting of reference sets. If this option is enabled, all members of a set are marked with a letter which may be used in citations referring to a set member rather than the entire set. The option defaults to `false`. See the style example for details.

alphabetic This style prints an alphabetic label similar to the `alpha.bst` style of traditional BibTeX. It is intended for use in conjunction with an alphabetic citation style. Note that the `shorthand` field overrides the default label. The style will set the following package options at load time: `labelalpha=true`, `sorting=anyt`.

authoryear This style differs from the other styles in that the year is not printed towards the end of the entry but rather after the author or editor. It is intended for use in conjunction with an author-year citation style. Recurring author and editor names are replaced by a dash unless the entry is the first one on the current page or

double-page spread. The style will set the following package options at load time: `labelyear=true`, `sorting=nyt`, `pagetracker=true`.

authortitle This style does not print any label at all. It is intended for use in conjunction with an author-title citation style. Recurring author and editor names are replaced by a dash unless the entry is the first one on the current page or double-page spread. The style will set the following package options at load time: `pagetracker=true`.

reading This special bibliography style is designed for personal reading lists, annotated bibliographies, and similar applications. It optionally includes the fields `annotation`, `abstract`, `library`, and `file` in the bibliography. If desired, it also adds various kinds of short headers to the bibliography. This style also provides the additional preamble options `entryhead`, `entrykey`, `annotation`, `abstract`, `library`, and `file` which control whether or not the corresponding items are printed in the bibliography. See the style example for details. See also section 3.10.7. The style will set the following package options at load time: `loadfiles=true`, `entryhead=true`, `entrykey=true`, `annotation=true`, `abstract=true`, `library=true`, `file=true`.

The following bibliography styles are special purpose styles. They are not intended for the final version of a document:

draft This draft style includes the entry keys in the bibliography. The bibliography will be sorted by entry key. The style will set the following package options at load time: `sorting=debug`.

debug This style prints all bibliographic data in tabular format. It is intended for debugging only and will set the following package options at load time: `sorting=debug`.

3.4 Sorting options

This package supports various sorting schemes for the bibliography. The sorting scheme is selected with the `sorting` package option from section 3.1.2. Apart from the regular data fields there are also some special fields which may be used to optimize the sorting of the bibliography. Tables 3 and 4 give an outline of the alphabetic sorting schemes supported by this package. Chronological sorting schemes are listed in table 5. A few explanations concerning these tables are in order.

The first item considered in the sorting process is always the `presort` field of the entry. If this field is undefined, this package will use the default value ‘`mm`’ as a presort string. The next item considered is the `sortkey` field. If this field is defined, it serves as the master sort key. Apart from the `presort` field, no further data is considered in this case. If the `sortkey` field is undefined, sorting continues with the name. The package will try using the `sortname`, `author`, `editor`, and `translator` fields, in this order. Which fields are considered also depends on the setting of the `useauthor`, `useditor`, and `usetranslator` options. If all three of them are disabled, the `sortname` field is ignored as well. Note that all name fields are responsive to the setting of the global `maxnames` and `minnames` options. If no name field is available, either because all of them are undefined or because `useauthor`, `useditor`, and `usetranslator` are disabled, this package

Option	Sorting scheme
nty	<pre> presort → sortname → sorttitle → sortyear → volume ↪ mm ↪ author ↪ title ↪ year ↪ 0000 ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
nyt	<pre> presort → sortname → sortyear → sorttitle → volume ↪ mm ↪ author ↪ year ↪ title ↪ 0000 ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
nyvt	<pre> presort → sortname → sortyear → volume → sorttitle ↪ mm ↪ author ↪ year ↪ 0000 ↪ title ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
all	<pre> presort → sortkey ↪ mm </pre>

Table 3: Alphabetic sorting schemes I

will fall back to the `sorttitle` and `title` fields as a last resort. The remaining items are, in various order: the `sortyear` field, if defined, or the first four digits of the year field otherwise; the `sorttitle` field, if defined, or the `title` field otherwise; the volume field, which is padded to four digits with leading zeros, or the string `0000` otherwise. Note that the sorting schemes shown in table 4 include an additional item: `labelalpha` is the label used by ‘alphabetic’ bibliography styles. Strictly speaking, the string used for sorting is `labelalpha + extraalpha`. The sorting schemes in table 4 are intended to be used in conjunction with alphabetic styles only.

The chronological sorting schemes presented in table 5 also make use of the `presort` and `sortkey` fields, if defined. The next item considered is the `sortyear` or the year field, depending on availability. The `ynt` scheme extracts the first four Arabic figures from the field. If both fields are undefined, the string `9999` is used as a fallback value. This means that all entries without a year will be moved to the end of the list. The `ydnt` scheme is similar in concept but sorts the year in descending order. As with the `ynt` scheme, the string `9999` is used as a fallback value. The remaining items are similar to the alphabetic sorting schemes discussed above. Note that the `ydnt` sorting scheme will only sort the date in descending order. All other items are sorted in ascending order as usual.

Using special fields such as `sortkey`, `sortname`, or `sorttitle` is usually not required. The `biblatex` package is quite capable of working out the desired sorting order by using the data found in the regular fields of an entry. You will only need them if you want to manually modify the sorting order of the bibliography or if any data required for sorting is missing. Please refer to the field descriptions in section 2.2.3 for details on possible uses of the special fields. Also note that

Option	Sorting scheme
anyt	<pre> presort → labelalpha → sortname → sortyear → sorttitle → volume ↪ mm ↪ author ↪ year ↪ title ↪ 0000 ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
anyvt	<pre> presort → labelalpha → sortname → sortyear → volume → sorttitle ↪ mm ↪ author ↪ year ↪ 0000 ↪ title ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
all	<pre> presort → labelalpha → sortkey ↪ mm </pre>

Table 4: Alphabetic sorting schemes II

using `bibtex8` or `Biber` instead of legacy `bibtex` is strongly recommended. See the package option `bibtex8` in section 3.1.3 for details.

3.5 Bibliography commands

3.5.1 The bibliography

`\bibliography{⟨bib files⟩}`

This command is used in the document preamble to specify a single `bib` file or a comma-separated list of `bib` files. It does not print anything.

`\printbibliography[⟨key=value, ...⟩]`

This command prints the bibliography. It takes one optional argument, which is a list of options given in `⟨key⟩=⟨value⟩` notation. The following options are available:

`heading=⟨name⟩` default: `bibliography`

The bibliography usually has a heading similar to a chapter or section. This option selects the heading `⟨name⟩`, as defined with `\defbibheading`. By default, `\printbibliography` uses the heading `bibliography` which may be redefined if desired. See section 3.5.6 for details.

`prenote=⟨name⟩`

The prenote is an arbitrary piece of text to be printed after the heading but before the list of references. This option selects the prenote `⟨name⟩`, as defined with `\defbibnote`. By default, no prenote is printed. The note is printed in the standard text font. It is not affected by `\bibsetup` and `\bibfont` but it may contain its own font declarations. See section 3.5.7 for details.

`postnote=⟨name⟩`

The postnote is an arbitrary piece of text to be printed after the list of references. This option selects the postnote `⟨name⟩`, as defined with `\defbibnote`. By default,

Option	Sorting scheme
ynt	<pre> presort → sortyear → sortname → sorttitle ↪ mm ↪ year ↪ author ↪ title ↪ 9999 ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
ydnt	<pre> presort → sortyear (desc.) → sortname → sorttitle ↪ mm ↪ year (desc.) ↪ author ↪ title ↪ 9999 ↪ editor ↪ translator ↪ sorttitle ↪ title </pre>
all	<pre> presort → sortkey ↪ mm </pre>

Table 5: Chronological sorting schemes

no postnote is printed. The note is printed in the standard text font. It is not affected by `\bibsetup` and `\bibfont` but it may contain its own font declarations. See section 3.5.7 for details.

`maxnames`= $\langle integer \rangle$

The threshold for all lists of names. This option overrides the `maxnames` package option locally. The value may not be smaller than the global setting.

`minnames`= $\langle integer \rangle$

The name limit affecting all lists of names. This option overrides the `minnames` package option locally. The value may not be smaller than the global setting.

`maxitems`= $\langle integer \rangle$

The threshold for all literal lists. This option overrides the `maxitems` package option locally.

`minitems`= $\langle integer \rangle$

The item limit affecting all literal lists. This option overrides the `minitems` package option locally.

`section`= $\langle integer \rangle$ default: 0

Print only entries cited in reference section $\langle integer \rangle$. The reference sections are numbered starting at 1. All citations given outside a `refsection` environment are assigned to section 0. See section 3.5.3 for details and 3.10.3 for usage examples. When giving a chain of multiple filters, the `section` filter must always be given first.

`segment`= $\langle integer \rangle$ default: 0

Print only entries cited in reference segment $\langle integer \rangle$. The reference segments are

numbered starting at 1. All citations given outside a refsegment environment are assigned to segment 0. See section 3.5.4 for details and 3.10.3 for usage examples.

`type=<type>`

Print only entries whose entry type is *<type>*.

`nottype=<type>`

Print only entries whose entry type is not *<type>*. This option may be used multiple times.

`keyword=<keyword>`

Print only entries whose keywords field includes *<keyword>*. This option may be used multiple times.

`notkeyword=<keyword>`

Print only entries whose keywords field does not include *<keyword>*. This option may be used multiple times.

`category=<category>`

Print only entries assigned to category *<category>*. This option may be used multiple times.

`notcategory=<category>`

Print only entries not assigned to category *<category>*. This option may be used multiple times.

`filter=<name>`

Print only entries matching the filter *<name>*, as defined with `\defbibfilter`. See section 3.5.8 for details.

`\bibbysection[<key=value,...>]`

This command automatically loops over all reference sections. This is equivalent to giving one `\printbibliography` command for every section but has the additional benefit of automatically skipping sections without references. Note that `\bibbysection` starts looking for references in section 1. It will ignore references given outside of `refsection` environments since they are assigned to section 0. See section 3.10.3 for usage examples. The options are a subset of those supported by `\printbibliography`. Valid options are `heading`, `prenote`, `postnote`, `maxnames`, `minnames`, `maxitems`, `minitems`.

`\bibbysegment[<key=value,...>]`

This command automatically loops over all reference segments. This is equivalent to giving one `\printbibliography` command for every segment but has the additional benefit of automatically skipping segments without references. Note that `\bibbysegment` starts looking for references in segment 1. It will ignore references given outside of `refsegment` environments since they are assigned to segment

0. See section 3.10.3 for usage examples. The options are a subset of those supported by `\printbibliography`. Valid options are `heading`, `prenote`, `postnote`, `maxnames`, `minnames`, `maxitems`, `minitems`, and `section`.

`\bibbcategory`[$\langle key=value, \dots \rangle$]

This command loops over all bibliography categories. This is equivalent to giving one `\printbibliography` command for every category but has the additional benefit of automatically skipping empty categories. The categories are processed in the order in which they were declared. See section 3.10.3 for usage examples. The options are a subset of those supported by `\printbibliography`. Valid options are `prenote`, `postnote`, `maxnames`, `minnames`, `maxitems`, `minitems`, and `section`. Note that `heading` is not available with this command. The name of the current category is automatically used as the heading name. This is equivalent to passing `heading=\langle category \rangle` to `\printbibliography` and implies that there must be a matching heading definition for every category.

3.5.2 The list of shorthands

If any entry includes a shorthand field, `biblatex` automatically builds a list of shorthands which may be printed in addition to the regular bibliography. The following command prints the list of shorthands.

`\printshorthands`[$\langle key=value, \dots \rangle$]

It takes one optional argument, which is a list of options given in $\langle key \rangle = \langle value \rangle$ notation. The options are a subset of those supported by `\printbibliography`. Valid options are `heading`, `prenote`, `postnote`, `maxnames`, `minnames`, `maxitems`, `minitems`, and `section`. If there are any `refsection` environments in the document, the list of shorthands will be local to these environments; see section 3.5.3 for details. By default, this command uses the heading shorthands which may be redefined if desired. See section 3.5.6 for details.

3.5.3 Bibliography sections

The `refsection` environment is used in the document body to mark a reference section. This environment is useful if you want separate, independent bibliographies and lists of shorthands in each chapter, section, or any other part of a document.

`\begin{refsection}`[$\langle bib files \rangle$]
`\end{refsection}`

Within a reference section all cited works are assigned labels which are local to the environment. `refsection` environments may not be nested, but you may use `refsegment` environments within a `refsection` to subdivide it into segments. Use the `section` option of `\printbibliography` to select a section when printing the bibliography and the corresponding option of `\printshorthands` when printing the list of shorthands. Bibliography sections are numbered starting at 1 and the number of the current section will be written to the transcript file. All citations given outside a `refsection` environment are assigned to section 0. If

`\printbibliography` is used within a `refsection`, it will automatically select the current section. The `refsection` option is not required in this case. This also applies to `\printshorthands`. If the optional argument `<bib files>` is omitted, `biblatex` uses the global list of bib files, as specified with `\bibliography` in the preamble. Technically, reference sections are completely independent from document divisions such as `\chapter` and `\section` even though they will most likely be used per chapter or section. See the `refsection` package option in section 3.1.2 for a way to automate this. Also see section 3.10.3 for usage examples.

`\newrefsection`[*<bib files>*]

This command is similar to the `refsection` environment except that it is a stand-alone command rather than an environment. It automatically ends the previous reference section (if any) and immediately starts a new one. Note that the reference section started by the last `\newrefsection` command will extend to the end of the document. Use `\endrefsection` if you want to terminate it earlier. Also see the `refsection` package option in section 3.1.2.

3.5.4 Bibliography segments

The `refsegment` environment is used in the document body to mark a reference segment. This environment is useful if you want one global bibliography which is subdivided by chapter, section, or any other part of the document.

`\begin{refsegment}`
`\end{refsegment}`

The difference between a `refsection` and a `refsegment` environment is that the former creates labels which are local to the environment whereas the latter provides a target for the `segment` filter of `\printbibliography` without affecting the labels. They will be unique across the entire document. `refsegment` environments may not be nested, but you may use them in conjunction with `refsection` to subdivide a reference section into segments. In this case, the segments are local to the enclosing `refsection` environment. Use the `refsegment` option of `\printbibliography` to select a segment when printing the bibliography. The reference segments are numbered starting at 1 and the number of the current segment will be written to the transcript file. All citations given outside a `refsegment` environment are assigned to segment 0. In contrast to the `refsection` environment, the current segment is not selected automatically if `\printbibliography` is used within a `refsegment` environment. Technically, reference segments are completely independent from document divisions such as `\chapter` and `\section` even though they will typically be used per chapter or section. See the `refsegment` package option in section 3.1.2 for a way to automate this. Also see section 3.10.3 for usage examples.

`\newrefsegment` This command is similar to the `refsegment` environment except that it is a stand-alone command rather than an environment. It automatically ends the previous reference segment (if any) and immediately starts a new one. Note that the reference segment started by the last `\newrefsegment` command will extend to the

end of the document. Use `\endrefsegment` if you want to terminate it earlier. Also see the `refsegment` package option in section 3.1.2.

3.5.5 Bibliography categories

Bibliography categories allow you to split the bibliography into multiple parts dedicated to different topics or different types of references, for example primary and secondary sources. See section 3.10.4 for usage examples.

```
\DeclareBibliographyCategory{<category>}
```

Declares a new `<category>`, to be used in conjunction with `\addtcategory` and the `category` and `notcategory` filters of `\printbibliography`. This command is used in the document preamble.

```
\addtcategory{<category>}{<key>}
```

Assigns a `<key>` to a `<category>`, to be used in conjunction with the `category` and `notcategory` filters of `\printbibliography`. This command may be used in the preamble and in the document body. The `<key>` may be a single entry key or a comma-separated list of keys. The assignment is global.

3.5.6 Bibliography headings

The following command defines the heading `<name>`, to be used in conjunction with the `heading` option of `\printbibliography` and `\printshorthands`:

```
\defbibheading{<name>}{<code>}
```

Note that the `<code>` should be LaTeX code producing a fully-fledged heading, including page headers and an entry in the table of contents, if desired. Also see section 3.11.5.

The following headings intended for use with `\printbibliography` are predefined:

`bibliography`

This is the default heading used by `\printbibliography` if the `heading` option is not given. Its default definition depends on the document class. If the class provides a `\chapter` command, the heading is similar to the `bibliography` heading of the standard LaTeX book class, i. e., it uses `\chapter*` to create an unnumbered chapter heading which is not included in the table of contents. If there is no `\chapter` command, it is similar to the `bibliography` heading of the standard LaTeX article class, i. e., it uses `\section*` to create an unnumbered section heading which is not included in the table of contents. The string used in the heading also depends on the document class. With book-like classes the `bibliography` string `bibliography` is used, with other classes it is `references` (see section 4.8.2). See also sections 3.11.1 and 3.11.2 for class-specific hints.

`subbibliography`

Similar to `bibliography` but one sectioning level lower. This heading definition

uses `\section*` instead of `\chapter*` with a book-like class and `\subsection*` instead of `\section*` otherwise.

`bibintoc`

Similar to `bibliography` above but adds an entry to the table of contents.

`subbibintoc`

Similar to `subbibliography` above but adds an entry to the table of contents.

`bibnumbered`

Similar to `bibliography` above but uses `\chapter` or `\section` to create a numbered heading which is also added to the table of contents.

`subbibnumbered`

Similar to `subbibliography` above but uses `\section` or `\subsection` to create a numbered heading which is also added to the table of contents.

The following headings intended for use with `\printshorthands` are predefined:

`shorthands`

This is the default heading used by `\printshorthands` if the heading option is not given. It is similar to `bibliography` above except that it uses the bibliography string `shorthands` instead of `bibliography` or `references` (see section 4.8.2). See also sections 3.II.1 and 3.II.2 for class-specific hints.

`losintoc`

Similar to `shorthands` above but adds an entry to the table of contents.

`losnumbered`

Similar to `shorthands` above but uses `\chapter` or `\section` to create a numbered heading which is also added to the table of contents.

3.5.7 Bibliography notes

The following command defines the note $\langle name \rangle$, to be used via the `prenote` and `postnote` options of `\printbibliography` and `\printshorthands`:

```
\defbibnote{ $\langle name \rangle$ }{ $\langle text \rangle$ }
```

The $\langle text \rangle$ may be any arbitrary piece of text, possibly spanning several paragraphs and containing font declarations. Also see section 3.II.5.

3.5.8 Bibliography filters

The following command defines the custom filter $\langle name \rangle$, to be used via the `filter` option of `\printbibliography`:

`\defbibfilter{<name>}{<code>}`

The *<code>* is a test with boolean operators given in the syntax of the `ifthen` package. The following atomic tests are available in custom filters:

`\segment{<integer>}`

Matches all entries cited in reference segment *<integer>*.

`\type{<type>}`

Matches all entries whose entry type is *<type>*.

`\keyword{<keyword>}`

Matches all entries whose keywords field includes *<keyword>*.

`\category{<category>}`

Matches all entries assigned to *<category>* with `\addtcategory`.

Custom filters are local to the selected reference section. Use the section filter of `\printbibliography` to select a different section. This is not possible from within a custom filter. Here is an example of a filter definition:

```
\defbibfilter{example}{%
  \ ( \type{book} \or \type{inbook} \ )
  \and \keyword{abc}
  \and \not \keyword{xyz}}
```

Note the grouping commands `\ (and \)` as well as the boolean operators `\and`, `\or`, and `\not`. All spaces in this example are optional. This filter matches all entries whose entry type is either `book` or `inbook` and whose keywords field includes the keyword `'abc'` but not `'xyz'`.

3.5.9 Legacy commands

In standard LaTeX, the following command selects the `bst` file to be used by BibTeX.

`\bibliographystyle{<bstfile>}`

Since `biblatex` interfaces with BibTeX in a different way, this command will issue a warning and do nothing.

3.6 Citation commands

All citation commands generally take one mandatory and two optional arguments. The *<prenote>* is text to be printed at the beginning of the citation. This is usually a notice such as `'see'` or `'compare'`. The *<postnote>* is text to be printed at the very end of the citation. This is usually a page number. If only one of these arguments is given, it is taken as a postnote. If you want to specify a prenote but no postnote, you need to leave the second optional argument empty, as in `\cite[see][]{key}`. The *<key>* argument to all citation commands is mandatory. This is the entry key or

a comma-separated list of keys corresponding to the entry keys in the bib file. In sum, all basic citations commands listed further down have the following syntax:

```
\command[⟨prenote⟩][⟨postnote⟩]{⟨keys⟩}⟨punctuation⟩
```

If the autopunct package option from section 3.1.2 is enabled, they will scan ahead for any *⟨punctuation⟩* immediately following their last argument. This is useful to avoid spurious punctuation marks after citations. This feature is configured with `\DeclareAutoPunctuation`, see section 4.6.5 for details.

3.6.1 Standard commands

The following commands are defined by the citation style. Citation styles may provide any arbitrary number of specialized commands, but these are the standard commands typically provided by general-purpose styles.

```
\cite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
\Cite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

These are the bare citation commands. They print the citation without any additions such as parentheses. The numeric and alphabetic styles still wrap the label in square brackets since the reference may be ambiguous otherwise. `\Cite` is similar to `\cite` but capitalizes the name prefix of the first name in the citation if the `useprefix` option is enabled, provided that there is a name prefix and the citation style actually prints any name at all.

```
\parencite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
\Parencite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

These commands use a format similar to `\cite` but enclose the entire citation in parentheses. The numeric and alphabetic styles use square brackets instead. `\Parencite` is similar to `\parencite` but capitalizes the name prefix of the first name in the citation if the `useprefix` option is enabled, provided that there is a name prefix and the citation style actually prints any name at all.

```
\footcite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
\Footcite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

These commands use a format similar to `\cite` but put the entire citation in a footnote and add a period at the end. With the standard styles, both `\footcite` and `\Footcite` automatically capitalize the name prefix of the first name in the footnote if the `useprefix` option is enabled, provided that there is a name prefix and the citation style actually prints any name at all.

3.6.2 Style-specific commands

The following additional citation commands are only provided by some of the citation styles which ship with this package.

```
\textcite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
\Textcite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

These citation commands are provided by all non-verbose styles which ship with

this package. They are intended for use in the flow of text, replacing the subject of a sentence. They print the authors or editors followed by a citation label which is enclosed in parentheses. Depending on the citation style, the label may be a number, the year of publication, an abridged version of the title, or something else. The numeric and alphabetic styles use square brackets instead of parentheses. `\Textcite` is similar to `\textcite` but capitalizes the name prefix of the first name in the citation if the `useprefix` option is enabled, provided that there is a name prefix.

`\cite*`[*<prenote>*][*<postnote>*]{*<key>*}

This command is provided by all author-year and author-title styles. It is similar to the regular `\cite` command but merely prints the year or the title, respectively.

`\parencite*`[*<prenote>*][*<postnote>*]{*<key>*}

This command is provided by all author-year and author-title styles. It is similar to the regular `\parencite` command but merely prints the year or the title, respectively.

`\supercite`{*<key>*}

This command, which is only provided by the numeric styles, prints numeric citations as superscripts without brackets. It uses `\supercitedelim` instead of `\multicitedelim` as citation delimiter. Note that any *<prenote>* and *<postnote>* arguments are ignored. If they are given, `\supercite` will discard them and issue a warning message.

3.6.3 Qualified citation lists

This package supports a class of special citation commands called ‘multicite’ commands. The point of these commands is that their argument is a list of citations where each item forms a fully qualified citation with a pre- and/or postnote. This is particularly useful with parenthetical citations and citations given in footnotes. It is also possible to assign a pre- and/or postnote to the entire list. The multicite commands are built on top of backend commands like `\parencite` and `\footcite`. The citation style provides a multicite definition with `\DeclareMultiCiteCommand` (see section 4.3.1). The following example illustrates the syntax of multicite commands:

```
\parencites[35]{key1}[88--120]{key2}[23]{key3}
```

The format of the arguments is similar to that of the regular citation commands, except that only one citation command is given. If only one optional argument is given for an item in the list, it is taken as a postnote. If you want to specify a prenote but no postnote, you need to leave the second optional argument of the respective item empty:

```
\parencites[35]{key1}[chapter 2 in []]{key2}[23]{key3}
```

In addition to that, the entire citation list may also have a pre- and/or postnote. The syntax of these global notes differs from other optional arguments in that they are given in parentheses rather than the usual brackets:

```
\parencites (and chapter 3) [35] {key1} [78] {key2} [23] {key3}
\parencites (Compare) () [35] {key1} [78] {key2} [23] {key3}
\parencites (See) (and the introduction) [35] {key1} [78] {key2} [23] {key3}
```

Note that the multicite commands keep on scanning for arguments until they encounter a token that is not the start of an optional or mandatory argument. If a left brace or bracket follows a multicite command, you need to mask it by adding `\relax` or a control space (a backslash followed by a space) after the last valid argument. This will cause the scanner to stop.

```
\parencites [35] {key1} [78] {key2} \relax [...]
\parencites [35] {key1} [78] {key2} \_ [...]
```

By default, this package provides the following multicite commands which correspond to regular commands from sections 3.6.1 and 3.6.2:

```
\cites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
\Cites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
```

The multicite version of `\cite` and `\Cite`, respectively.

```
\parencites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
\Parencites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
```

The multicite version of `\parencite` and `\Parencite`, respectively.

```
\footcites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
\Footcites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
```

The multicite version of `\footcite` and `\Footcite`, respectively.

```
\supercites (<pre>) (<post>) [pre] [post] {<key>} . . . [pre] [post] {<key>}
```

Like the `\supercite` command from section 3.6.2, this one is only provided by the numeric styles. It prints the numeric citations as superscripts without brackets. This citation command uses `\supercitedelim` instead of `\multicitedelim` as citation delimiter.

3.6.4 Style-independent commands

Sometimes it is desirable to give the citations in the source file in a format that is not tied to a specific citation style and can be modified globally in the preamble. The format of the citations is easily changed by loading a different citation style. However, when using commands such as `\parencite` or `\footcite`, the way the citations are integrated with the text is still effectively hard-coded. The idea behind the `\autocite` command is to provide higher-level citation markup which makes global switching from inline citations to citations given in footnotes (or as superscripts) possible. The `\autocite` command is built on top of backend commands like `\parencite` and `\footcite`. The citation style provides an `\autocite` defin-

ition with `\DeclareAutoCiteCommand` (see section 4.3.1). This definition may be activated with the `autocite` package option from section 3.1.2. The citation style will usually initialize this package option to a value which is suitable for the style, see section 3.3.1 for details. Note that there are certain limits to high-level citation markup. For example, inline author-year citation schemes often integrate citations so tightly with the text that it is virtually impossible to automatically convert them to footnotes. The `\autocite` command is only applicable in cases in which you would normally use `\parencite` or `\footcite` (or `\supercite`, with a numeric style). The citations should be given at the end of a sentence or a partial sentence, immediately preceding the terminal punctuation mark, and they should not be a part of the sentence in a grammatical sense (like `\textcite`, for example).

```
\autocite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}  
\Autocite[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

In contrast to other citation commands, the `\autocite` command does not only scan ahead for punctuation marks following its last argument to avoid double punctuation marks, it actually moves them around if required. For example, with `autocite=footnote`, a trailing punctuation mark will be moved such that the footnote mark is printed after the punctuation. `\Autocite` is similar to `\autocite` but capitalizes the name prefix of the first name in the citation if the `useprefix` option is enabled, provided that there is a name prefix and the citation style actually prints any name at all.

```
\autocite*[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}  
\Autocite*[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

The starred variants of `\autocite` do not behave differently from the regular ones. The asterisk is simply passed on to the backend command. For example, if `\autocite` is configured to use `\parencite`, then `\autocite*` will execute `\parencite*`.

```
\autocites(⟨pre⟩)(⟨post⟩)[⟨pre⟩][⟨post⟩]{⟨key⟩}...[⟨pre⟩][⟨post⟩]{⟨key⟩}  
\Autocites(⟨pre⟩)(⟨post⟩)[⟨pre⟩][⟨post⟩]{⟨key⟩}...[⟨pre⟩][⟨post⟩]{⟨key⟩}
```

This is the multicite version of `\autocite`. It also detects and moves punctuation if required. Note that there is no starred variant. `\Autocites` is similar to `\autocites` but capitalizes the name prefix of the first name in the citation if the `useprefix` option is enabled, provided that there is a name prefix and the citation style actually prints any name at all.

3.6.5 Text commands

The following commands are provided by the core of `biblatex`. They are intended for use in the flow of text. Note that all text commands are excluded from citation tracking.

```
\citeauthor[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}  
\Citeauthor[⟨prenote⟩][⟨postnote⟩]{⟨key⟩}
```

These commands print the authors. If there is no author field, they print the

editor instead. `\Citeauthor` is similar to `\citeauthor` but capitalizes the name prefix of the first name in the citation if the `useprefix` option is enabled, provided that there is a name prefix.

`\citetitle`[*prenote*][*postnote*]{*key*}

`\citetitle*`[*prenote*][*postnote*]{*key*}

This command prints the title. It will use the abridged title in the `shorttitle` field, if available. Otherwise it falls back to the full title found in the `title` field. The starred variant always prints the full title.

`\citeyear`[*prenote*][*postnote*]{*key*}

This command prints the year field.

`\citeurl`[*prenote*][*postnote*]{*key*}

This command prints the `url` field.

3.6.6 Special commands

The following special commands are also provided by the core of `biblatex`.

`\nocite`{*key*}

This command is similar to the standard LaTeX `\nocite` command. It adds the `<key>` to the bibliography. If the `<key>` is an asterisk, all entries available in the `bib` file are added to the bibliography. In either case, no citation is printed.

`\fullcite`[*prenote*][*postnote*]{*key*}

This command uses the bibliography driver for the respective entry type to create a full citation similar to the bibliography entry. It is thus related to the bibliography style rather than the citation style.

`\footfullcite`[*prenote*][*postnote*]{*key*}

Similar to `\fullcite` but puts the entire citation in a footnote and adds a period at the end.

`\volcite`[*prenote*]{*volume*}[*page*]{*key*}

`\Volcite`[*prenote*]{*volume*}[*page*]{*key*}

These commands are similar to `\cite` and `\Cite` but intended for references to multi-volume works which are cited by volume and page number. Instead of the `<postnote>`, they take a mandatory `<volume>` and an optional `<page>` argument. Since they merely compose the postnote and pass it to the `\cite` command provided by the citation style as a `<postnote>` argument, these commands are style independent.

`\pvolcite`[*prenote*]{*volume*}[*page*]{*key*}

`\Pvolcite`[*prenote*]{*volume*}[*page*]{*key*}

Similar to `\volcite` but based on `\parencite`.

`\fvolcite`[*<prenote>*][*<volume>*][*<page>*]{*<key>*}
`\Fvolcite`[*<prenote>*][*<volume>*][*<page>*]{*<key>*}

Similar to `\volcite` but based on `\footcite`.

`\tvolcite`[*<prenote>*][*<volume>*][*<page>*]{*<key>*}
`\Tvolcite`[*<prenote>*][*<volume>*][*<page>*]{*<key>*}

Similar to `\volcite` but based on `\textcite`.

`\avolcite`[*<prenote>*][*<volume>*][*<page>*]{*<key>*}
`\Avolcite`[*<prenote>*][*<volume>*][*<page>*]{*<key>*}

Similar to `\volcite` but based on `\autocite`.

`\notecite`[*<prenote>*][*<postnote>*]{*<key>*}
`\Notecite`[*<prenote>*][*<postnote>*]{*<key>*}

These commands print the *<prenote>* and *<postnote>* arguments but no citation. Instead, a `\nocite` command is issued for every *<key>*. This may be useful for authors who incorporate implicit citations in their writing, only giving information not mentioned before in the running text, but who still want to take advantage of the automatic *<postnote>* formatting and the implicit `\nocite` function. This is a generic, style-independent citation command. Special citation styles may provide smarter facilities for the same purpose. The capitalized version forces capitalization (note that this is only applicable if the note starts with a command which is sensitive to bibl_{at}ex's punctuation tracker).

`\pnotecite`[*<prenote>*][*<postnote>*]{*<key>*}
`\Pnotecite`[*<prenote>*][*<postnote>*]{*<key>*}

Similar to `\notecite` but the notes are printed in parentheses.

`\fnotecite`[*<prenote>*][*<postnote>*]{*<key>*}
`\Fnotecite`[*<prenote>*][*<postnote>*]{*<key>*}

Similar to `\notecite` but the notes are printed in a footnote.

3.6.7 Low-level commands

The following commands are also provided by the core of bibl_{at}ex. They grant access to all lists and fields at a lower level.

`\citenam`[*<prenote>*][*<postnote>*]{*<key>*}[*<format>*]{*<name list>*}

The *<format>* is a formatting directive defined with `\DeclareNameFormat`. Formatting directives are discussed in section 4.4.2. If this optional argument is omitted, this command falls back to the format `citenam`. The last argument is the name of a *<name list>*, in the sense explained in section 2.2.

`\citelist`[*<prenote>*][*<postnote>*]{*<key>*}[*<format>*]{*<literal list>*}

The *<format>* is a formatting directive defined with `\DeclareListFormat`. Formatting directives are discussed in section 4.4.2. If this optional argument is omitted,

this command falls back to the format `citelist`. The last argument is the name of a *literal list*, in the sense explained in section 2.2.

`\citefield`[*prenote*][*postnote*]{*key*}[*format*]{*field*}

The *format* is a formatting directive defined with `\DeclareFieldFormat`. Formatting directives are discussed in section 4.4.2. If this optional argument is omitted, this command falls back to the format `citefield`. The last argument is the name of a *field*, in the sense explained in section 2.2.

3.6.8 Miscellaneous commands

The commands in this section are little helpers related to citations.

`\citereset` This command resets the citation style. This may be useful if the style replaces repeated citations with abbreviations like *ibidem*, *idem*, *op. cit.*, etc. and you want to force a full citation at the beginning of a new chapter, section, or some other location. The command executes a style specific initialization hook defined with the `\InitializeCitationStyle` command from section 4.3.1. It also resets the internal citation trackers of this package. The reset will affect the `\ifciteseen`, `\ifentryseen`, `\ifciteibid`, and `\ifciteidem` tests discussed in section 4.5.2. When used in a refsection environment, the reset of the citation tracker is local to the current refsection environment. Also see the `citereset` package option in section 3.1.2.

`\citereset*` Similar to `\citereset` but only executes the style's initialization hook, without resetting the internal citation trackers.

`\mancite` Use this command to mark manually inserted citations if you mix automatically generated and manual citations. This is particularly useful if the citation style replaces repeated citations by an abbreviation like *ibidem* which may get ambiguous or misleading otherwise. Always use `\mancite` in the same context as the manual citation, e. g., if the citation is given in a footnote, include `\mancite` in the footnote. The `\mancite` command executes a style specific reset hook defined with the `\OnManualCitation` command from section 4.3.1. It also resets the internal 'ibidem' and 'idem' trackers of this package. The reset will affect the `\ifciteibid` and `\ifciteidem` tests discussed in section 4.5.2.

`\pno` This command forces a single page prefix in the *postnote* argument to a citation command. See section 3.II.3 for further details and usage instructions. Note that this command is only available locally in citations and the bibliography.

`\ppno` Similar to `\pno` but forces a range prefix. See section 3.II.3 for further details and usage instructions. Note that this command is only available locally in citations and the bibliography.

`\nopp` Similar to `\pno` but suppresses all prefixes. See section 3.II.3 for further details and usage instructions. Note that this command is only available locally in citations and the bibliography.

`\psq` In the *postnote* argument to a citation command, this command indicates a range

of two pages where only the starting page is given. See section 3.11.3 for further details and usage instructions. The suffix printed is the bibliography string `sequens`, see section 4.8.2. The spacing inserted between the suffix and the page number may be modified by redefining the macro `\sqspace`. The default is an unbreakable interword space. Note that this command is only available locally in citations and the bibliography.

`\psqq` Similar to `\psq` but indicates an open-ended page range. See section 3.11.3 for further details and usage instructions. The suffix printed is the bibliography string `sequentes`, see section 4.8.2. This command is only available locally in citations and the bibliography.

`\RN{⟨integer⟩}`

This command prints an integer as an uppercase Roman numeral. The formatting applied to the numeral may be modified by redefining the macro `\RNfont`.

`\Rn{⟨integer⟩}`

Similar to `\RN` but prints a lowercase Roman numeral. The formatting applied to the numeral may be modified by redefining the macro `\Rnfont`.

3.6.9 Compatibility commands for `natbib`

If the `natbib` package option is enabled, `biblatex` will load a `natbib` compatibility style in addition to the main citation style. The compatibility style defines aliases for the citation commands provided by the `natbib` package, version 7. This includes aliases for the core citation commands `\citet` and `\citep` as well as the variants `\citealt` and `\citealp`. The starred variants of these commands, which print the full author list, are also supported. The `\cite` command, which is handled in a particular way by `natbib`, is not treated specially. The text commands (`\citeauthor`, `\citeyear`, etc.) are also supported, as are all commands which capitalize the name prefix (`\Citet`, `\Citep`, `\Citeauthor`, etc.). Aliasing with `\defcitealias`, `\citetalias`, and `\citepalias` is possible as well. Note that the compatibility commands will not emulate the citation format of the `natbib` package. They merely map `natbib`'s commands to functionally equivalent facilities of the `biblatex` package. The actual citation format depends on the main citation style.

3.7 Localization commands

The `biblatex` package provides translations for key terms such as ‘edition’ or ‘volume’ as well as definitions for language-specific features such as the date format and ordinals. These definitions, which are loaded automatically, may be modified or extended in the document preamble or the configuration file with the commands introduced in this section.

`\DefineBibliographyStrings{⟨language⟩}{⟨definitions⟩}`

This command is used to define bibliography strings. The `⟨language⟩` must be a language name known to the `babel` package, i. e., one of the identifiers listed

in table 1 on page 23. The *definitions* are *key*=*value* pairs which assign an expression to an identifier:

```
\DefineBibliographyStrings{american}{%
  bibliography = {Bibliography},
  shorthands   = {Abbreviations},
  editor       = {editor},
  editors      = {editors},
}
```

A complete list of all keys supported by default is given in section 4.8.2. Note that all expressions should be capitalized as they usually are when used in the middle of a sentence. The `biblatex` package will automatically capitalize the first word when required at the beginning of a sentence. Expressions intended for use in headings should be capitalized in a way that is suitable for titling. See section 4.8.1 for further details.

`\DefineBibliographyExtras{<language>}{<code>}`

This command is used to adapt language-specific features such as the date format and ordinals. The *language* must be a language name known to the `babel` package. The *code*, which may be arbitrary LaTeX code, will usually consist of redefinitions of the formatting commands from section 3.8.2.

`\UndefineBibliographyExtras{<language>}{<code>}`

This command is used to restore the original definition of any commands modified with `\DefineBibliographyExtras`. If a redefined command is included in section 3.8.2, there is no need to restore its previous definition since these commands are adapted by all language modules anyway.

`\DefineHyphenationExceptions{<language>}{<text>}`

This is a LaTeX frontend to TeX's `\hyphenation` command which defines hyphenation exceptions. The *language* must be a language name known to the `babel` package. The *text* is a whitespace-separated list of words. Hyphenation points are marked with a dash:

```
\DefineHyphenationExceptions{american}{%
  hy-phen-ation ex-cep-tion
}
```

`\NewBibliographyString{<key>}`

This command initializes a new bibliography string, i.e., it adds a new *key* to be used in the *definitions* of `\DefineBibliographyStrings`. The keys listed in section 4.8.2 are defined by default.

3.8 Formatting commands

The commands and facilities presented in this section may be used to adapt the format of citations and the bibliography.

3.8.1 Generic commands and hooks

The commands in this section may be redefined with `\renewcommand` in the document preamble. Note that all commands starting with `\mk...` take one argument. All of these commands are defined in `biblatex.def` to make it easier to look up the defaults.

- `\bibsetup` Arbitrary code to be executed at the beginning of the bibliography, intended for commands which affect the layout of the bibliography.
- `\bibfont` Arbitrary code setting the font used in the bibliography. This is very similar to `\bibsetup` but intended for switching fonts.
- `\citesetup` Arbitrary code to be executed at the beginning of each citation command.
- `\newblockpunct` The separator inserted between ‘blocks’ in the sense explained in section 4.6.I. The default definition is controlled by the package option `block` (see section 3.I.2).
- `\newunitpunct` The separator inserted between ‘units’ in the sense explained in section 4.6.I. This will usually be a period or a comma plus an interword space. The default definition is a period and a space.
- `\finentrypunct` The punctuation printed at the very end of every bibliography entry, usually a period. The default definition is a period.
- `\bibleftparen` The opening parenthesis.
- `\bibrightparen` The closing parenthesis.
- `\bibleftbracket` The opening square bracket.
- `\bibrightbracket` The closing square bracket.
- `\bibnamedash` The dash to be used as a replacement for recurrent authors or editors in the bibliography. The default is an ‘em’ or an ‘en’ dash, depending on the indentation of the list of references.
- `\labelnamepunct` The separator printed after the name used for alphabetizing in the bibliography (author or editor, if the author field is undefined). With the default styles, this separator replaces `\newunitpunct` at this location. The default definition is `\newunitpunct`, i. e., it is not handled differently from regular unit punctuation.
- `\subtitlepunct` The separator printed between the fields `title` and `subtitle`, `booktitle` and `booksubtitle`, as well as `maintitle` and `mainsubtitle`. With the default styles, this separator replaces `\newunitpunct` at this location. The default definition is `\newunitpunct`, i. e., it is not handled differently from regular unit punctuation.
- `\bibpagespunct` The separator printed before the `pages` field. The default is a comma plus an interword space.
- `\multinamedelim` The delimiter printed between multiple items in a name list like author or editor

if there are more than two names in the list. The default is a comma plus an interword space. See `\finalnamedelim` for an example.¹

`\finalnamedelim` The delimiter printed instead of `\multinamedelim` before the final name in a name list. The default is the localized term ‘and’, separated by interword spaces. Here is an example:

```
Michel Goossens, Frank Mittelbach and Alexander Samarin  
Edward Jones and Joe Williams
```

The comma in the first example is the `\multinamedelim` whereas the string ‘and’ in both examples is the `\finalnamedelim`. See also `\finalandcomma` in section 3.8.2.

`\revsdnamedelim` An extra delimiter printed after the first name in a name list if the first name is reversed. The default is an empty string, i. e., no extra delimiter will be printed. Here is an example showing a name list with a comma as `\revsdnamedelim`:

```
Jones, Edward, and Joe Williams
```

In this example, the comma after ‘Edward’ is the `\revsdnamedelim` whereas the string ‘and’ is the `\finalnamedelim`, printed in addition to the former.

`\andothersdelim` The delimiter printed before the bibliography string ‘andothers’ if a name list like author or editor is truncated. The default is an interword space.

`\multilistdelim` The delimiter printed between multiple items in a literal list like publisher or location if there are more than two items in the list. The default is a comma plus an interword space. See `\multinamedelim` for further explanation.

`\finallistdelim` The delimiter printed instead of `\multilistdelim` before the final item in a literal list. The default is the localized term ‘and’, separated by interword spaces. See `\finalnamedelim` for further explanation.

`\andmoredelim` The delimiter printed before the bibliography string ‘andmore’ if a literal list like publisher or location is truncated. The default is an interword space.

`\multicitedelim` The delimiter printed between citations if multiple entry keys are passed to a single citation command. The default is a semicolon plus an interword space.

`\supercitedelim` Similar to `\multicitedelim`, but used by the `\supercite` command only. The default is a comma.

`\compcitedelim` Similar to `\multicitedelim`, but used by certain citation styles when ‘compressing’ multiple citations. The default definition is a comma plus an interword space.

`\nameyeardelim` The delimiter printed between the author/editor and the year by author-year citation styles. The default is an interword space.

`\labelalphaothers` A string to be appended to the non-numeric portion of the `labelalpha` field (i. e., the field holding the citation label used by alphabetic citation styles) if the number

¹ Note that `\multinamedelim` is not used at all if there are only two names in the list. In this case, the default styles use the `\finalnamedelim`.

of authors/editors exceeds the `maxnames` threshold or the author/editor list was truncated in the `bib` file with the keyword ‘and others’. This will typically be a single character such as a plus sign or an asterisk. The default is a plus sign. This command may also be redefined to an empty string to disable this feature. In any case, it must be redefined in the preamble.

`\prenotedelim` The delimiter printed after the `\prenote` argument of a citation command. See section 3.6 for details. The default is an interword space.

`\postnotedelim` The delimiter printed before the `\postnote` argument of a citation command. See section 3.6 for details. The default is a comma plus an interword space.

`\mkbibnamelast`{*text*}

This command, which takes one argument, is used to format the last name of all authors, editors, translators, etc.

`\mkbibnamefirst`{*text*}

Similar to `\mkbibnamelast`, but intended for the first name.

`\mkbibnameprefix`{*text*}

Similar to `\mkbibnamelast`, but intended for the name prefix.

`\mkbibnameaffix`{*text*}

Similar to `\mkbibnamelast`, but intended for the name affix.

3.8.2 Language-specific commands

The commands in this section are language-specific. When redefining them, you need to wrap the new definition in a `\DeclareBibliographyExtras` command, see section 3.7 for details. Note that all commands starting with `\mk...` take one argument.

`\bibrangedash` The language-specific dash to be used for a range of numbers.

`\bibdatelong` The language-specific long date format. Note that this command takes no argument. It prints the date by using the `day`, `month`, and `year` fields of the current entry.

`\bibdateshort` Similar to `\bibdatelong`, but using the language-specific short date format.

`\biburldatelong` The language-specific long date format of the retrieval date of an internet address. Note that this command takes no argument. It prints the date by using the `urlday`, `urlmonth`, and `urlyear` fields of the current entry.

`\biburldateshort` Similar to `\biburldatelong`, but using the language-specific short date format.

`\finalandcomma` Prints the comma to be inserted before the final ‘and’ in a list, if applicable in the respective language. Here is an example:

Michel Goossens, Frank Mittelbach, and Alexander Samarin

`\finalandcomma` is the comma before the word ‘and’. See also `\multinamedelim`, `\finalnamedelim`, and `\revsdnamedelim` in section 3.8.1.

`\mkbibordinal`{*integer*}

This command, which takes an integer as its argument, prints an ordinal number.

`\mkbibmascord`{*integer*}

Similar to `\mkbibordinal`, but prints a masculine ordinal, if applicable in the respective language.

`\mkbibfemord`{*integer*}

Similar to `\mkbibordinal`, but prints a feminine ordinal, if applicable in the respective language.

`\mkbibordedition`{*integer*}

Similar to `\mkbibordinal`, but intended for use with the term ‘edition’.

`\mkbibordseries`{*integer*}

Similar to `\mkbibordinal`, but intended for use with the term ‘series’.

3.8.3 Lengths and counters

The length registers and counters in this section may be changed in the document preamble with `\setlength` and `\setcounter`, respectively.

`\bibhang` The hanging indentation of the bibliography, if applicable. This length is initialized to `\parindent` at load-time.

`\biblabelsep` The horizontal space between entries and their corresponding labels in the bibliography. This only applies to bibliography styles which print labels, such as the numeric and alphabetic styles. This length is initialized to twice the value of `\labelsep` at load-time.

`\bibitemsep` The vertical space between the individual entries in the bibliography. This length is initialized to `\itemsep` at load-time. Note that `\bibitemsep`, `\bibnamesep`, and `\bibinitsep` are cumulative. When they coincide, the largest value will be applied.

`\bibnamesep` Vertical space to be inserted between two entries in the bibliography whenever an entry starts with a name which is different from the initial name of the previous entry. The default value is zero. Setting this length to a positive value greater than `\bibitemsep` will group the bibliography by author/editor name. Note that `\bibitemsep`, `\bibnamesep`, and `\bibinitsep` are cumulative. When they coincide, the largest value will be applied.

`\bibinitsep` Vertical space to be inserted between two entries in the bibliography whenever an entry starts with a letter which is different from the initial letter of the previous entry. The default value is zero. Setting this length to a positive value greater than `\bibitemsep` will group the bibliography alphabetically. Note that `\bibitemsep`,

`\bibnamesep`, and `\bibinitsep` are cumulative. When they coincide, the largest value will be applied.

`\bibparsep` The vertical space between paragraphs within an entry in the bibliography. The default value is zero.

`abbrvpenalty` This counter, which is used by the localization modules, holds the penalty used in short or abbreviated bibliography strings. For example, a linebreak in expressions such as “et al.” or “ed. by” is unfortunate, but should still be possible to prevent overfull boxes. This counter is initialized to `\hyphenpenalty` at load-time. The idea is making TeX treat the whole expression as if it were a single, hyphenatable word as far as line-breaking is concerned. If you dislike such linebreaks, use a higher value. If you do not mind them at all, set this counter to zero. If you want to suppress them unconditionally, set it to ‘infinite’ (10 000 or higher).¹

`highnamepenalty` This counter holds a penalty which affects the line-breaking of names. This penalty is inserted between smaller chunks of a name, for example between the first and the middle name. This counter is initialized to `\hyphenpenalty` at load-time. If you dislike such linebreaks, use a higher value. If you do not mind them at all, set this counter to zero. If you prefer the traditional BibTeX behavior (no linebreaks at `highnamepenalty` breakpoints), set it to ‘infinite’ (10 000 or higher).²

`lownamepenalty` This counter holds a penalty which affects the line-breaking of names. This penalty is inserted between larger chunks of a name, for example between the chunk consisting of all first names and the last name. This counter is initialized to half the `\hyphenpenalty` at load-time. If you dislike such linebreaks, use a higher value. If you do not mind them at all, set this counter to zero.

3.8.4 All-purpose commands

The commands in this section are all-purpose text commands which are generally available, not only in citations and the bibliography.

`\bibellipsis` An ellipsis symbol with brackets: ‘[...]’.

¹ The default values assigned to `abbrvpenalty`, `lownamepenalty`, and `highnamepenalty` are deliberately very low to prevent overfull boxes. This implies that you will hardly notice any effect on line-breaking if the text is set justified. If you set these counters to 10 000 to suppress the respective breakpoints, you will notice their effect but you may also be confronted with overfull boxes. Keep in mind that line-breaking in the bibliography is often more difficult than in the body text and that you can not resort to rephrasing a sentence. In some cases it may be preferable to set the entire bibliography `\raggedright` to prevent suboptimal linebreaks. In this case, even the fairly low default penalties will make a visible difference.

² By default, BibTeX inserts the special character ~ (a non-breakable space) between certain parts of a name. This can lead to overfull boxes in the bibliography or in citations. While discouraging linebreaks at certain places is a good idea, using unbreakable spaces seems disproportionate given that TeX offers much more flexible facilities for controlling linebreaks. Therefore, `biblatex` redefines the active character ~ locally such that it inserts a space penalized by the value of the `highnamepenalty` counter. This redefinition is local to name lists and will not affect any other part of the document. Note that it will also affect explicitly inserted non-breakable spaces in name lists. If an explicit ~ in a name does not have the expected effect, you may need to set this counter to 10 000.

- `\hyphenate` A conditional hyphen. In contrast to the standard `\-` command, this one allows hyphenation in the rest of the word. It is similar to the `"-` shorthand provided by some language modules of the `babel` package.
- `\hyphen` An explicit, breakable hyphen intended for compound words. In contrast to a literal `'-`, this command allows hyphenation in the rest of the word. It is similar to the `"=` shorthand provided by some language modules of the `babel` package.
- `\nbhyphen` An explicit, non-breakable hyphen intended for compound words. In contrast to a literal `'-`, this command does not permit line breaks at the hyphen but still allows hyphenation in the rest of the word. It is similar to the `"~` shorthand provided by some language modules of the `babel` package.
- `\noligature` Disables ligatures at this position and adds some space. Use this command to break up standard ligatures like `'fi` and `'fl`. It is similar to the `"|` shorthand provided by some language modules of the `babel` package.

`\mknumalph{<integer>}`

Takes an integer in the range 1–702 as its argument and converts it to a string as follows: 1=a, . . . , 26=z, 27=aa, . . . , 702=zz. This is intended for use in formatting directives for the `labelyear` and `extraalpha` fields.

`\mkbibacro{<text>}`

Generic macro which typesets an acronym using the small caps variant of the current font, if available, and as-is otherwise. The acronym should be given in uppercase letters.

`\autocap{<character>}`

Automatically converts the `<character>` to its uppercase form if `biblatex`'s punctuation tracker would capitalize a bibliography string at the current location. This command is robust. It is useful for conditional capitalization of certain strings in an entry. Note that the `<character>` argument is a single character given in lowercase. For example:

```
\autocap{s}pecial issue
```

will yield `'Special issue'` or `'special issue'`, as appropriate. If the string to be capitalized starts with an inflected character given in Ascii notation, include the accent command in the `<character>` argument as follows:

```
\autocap{\'e}dition sp\'eciale
```

This will yield `'Édition spéciale'` or `'édition spéciale'`. If the string to be capitalized starts with a command which prints a character, such as `\ae` or `\oe`, simply put the command in the `<character>` argument:

```
\autocap{\oe}uvres
```

This will yield `'Œuvres'` or `'œuvres'`.

3.9 Language-specific facilities

The facilities discussed in this section are specific to certain localization modules.

3.9.1 American

The American localization module uses `\uspunctuation` from section 4.6.5 to enable ‘American-style’ punctuation. If this feature is enabled, all trailing commas and periods after `\mkbibquote` will be moved inside the quotes. If you want to disable this feature, use `\stdpunctuation` as follows:

```
\DefineBibliographyExtras{american}{%  
  \stdpunctuation  
}
```

By default, the ‘American punctuation’ feature is enabled by the `american` localization module only. The above code is only required if you want American localization without American punctuation. Since standard punctuation is the package default, it would be redundant with any other language.

It is highly advisable to always specify `american`, `british`, `australian`, etc. rather than `english` when loading the `babel` package to avoid any possible confusion. Older versions of the `babel` package used to treat `english` as an alias of `british`; more recent ones treat it as an alias of `american`. The `biblatex` package essentially treats `english` as an alias of `american`, except for the above feature which is only enabled if `american` is requested explicitly.

3.9.2 Spanish

Handling the word ‘and’ is more difficult in Spanish than in the other languages supported by this package because it may be ‘y’ or ‘e’, depending on the initial sound of the following word. Therefore, the Spanish localization module does not use the bibliography string ‘and’ but a special internal ‘smart and’ command. The behavior of this command is controlled by the `smartand` counter.

smartand This counter controls the behavior of the internal ‘smart and’ command. When set to 1, it prints ‘y’ or ‘e’, depending on the context. When set to 2, it always prints ‘y’. When set to 3, it always prints ‘e’. When set to 0, the ‘smart and’ feature is disabled. This counter is initialized to 1 at load-time and may be changed in the preamble. Note that setting this counter to a positive value implies that the Spanish localization module ignores `\finalnamedelim` and `\finallistdelim`.

\forceE Use this command in `bib` files if `biblatex` gets the ‘and’ before a certain name wrong. As its name suggests, it will enforce ‘e’. This command must be used in a special way to prevent confusing BibTeX. Here is an example:

```
author = {Edward Jones and Eoin Maguire},  
author = {Edward Jones and {\forceE{E}}oin Maguire},
```

Note that the initial letter of the respective name component is given as an argument to `\forceE` and that the entire construct is wrapped in an additional pair of curly braces.

`\forceY` Similar to `\forceE` but enforces ‘y’.

3.10 Usage notes

The following sections give a basic overview of the `biblatex` package and discuss some typical usage scenarios.

3.10.1 Overview

Using the `biblatex` package is only slightly different from using traditional BibTeX styles and related packages. Before we get to specific usage scenarios, we will therefore have a look at the structure of a typical document first:

```
\documentclass{...}
\usepackage[...]{biblatex}
\bibliography{bibfile}
\begin{document}
\cite{...}
...
\printbibliography
\end{document}
```

With traditional BibTeX, the `\bibliography` command serves two purposes. It marks the location of the bibliography and it also specifies the `bib` file, which may be a single file or a comma-separated list of files. The file extension is omitted in either case. With `biblatex`, this command only specifies the `bib` files and is used in the document preamble rather than in the body. It does not print anything. The bibliography is printed using the `\printbibliography` command which may be used multiple times (see section 3.5 for details). The document body may contain any number of citation commands (section 3.6). Processing this example file requires that a certain procedure be followed. Suppose our example file is called `example.tex` and our bibliographic data is in `bibfile.bib`. The procedure, then, is as follows:

1. Run `latex` on `example.tex`. If the file contains any citations, `biblatex` will request the respective data from BibTeX by writing commands to the auxiliary file `example.aux`.
2. Run `bibtex` on `example.aux`. BibTeX will retrieve the data from `bibfile.bib` and write it to the auxiliary file `example.bbl` in a format which can be processed by `biblatex`.
3. Run `latex` on `example.tex`. `biblatex` will read the data from `example.bbl` and print all citations as well as the bibliography.

Whenever a reference to a work which has not been cited before is added, this procedure must be repeated. This is also the case if the last reference to a work which has been cited before is removed because some citation labels may change in this case. In contrast to traditional BibTeX, there is normally no need to run `latex` twice after running `bibtex` as far as the handling of bibliographic data is

concerned.¹ Note that this only applies to the most basic case. Using the `xref` field or the `entryset` field may require an additional LaTeX/BibTeX/LaTeX cycle. Some other facilities provided by `biblatex` may also require an additional `latex` run to get certain references and the page tracking right. In this case, the usual warning messages such as “There were undefined references” and “Label(s) may have changed. Rerun to get cross-references right” will be printed.

3.10.2 Auxiliary files

By default, the `biblatex` package uses the main aux file only. Even if there are citation commands in a file included via `\include`, which has its own aux file, you only need to run BibTeX on the main aux file. If you are using `refsection` environments in a document (see section 3.10.3) `biblatex` will create one additional aux file for every `refsection` environment. In this case, you also need to run `bibtex` on each additional aux file. The name of the additional aux files is the base name of the main input file with the string `-blx` and a running number appended at the end. The `biblatex` package issues a warning listing the files which require an additional BibTeX run. With the basic example presented in section 3.10.1, it would issue the following warning:

```
Package biblatex Warning: Please (re)run BibTeX on the file(s):
(biblatex)                example.aux
(biblatex)                and rerun LaTeX afterwards.
```

If the input file contained three `refsection` environments, the warning would read as follows:

```
Package biblatex Warning: Please (re)run BibTeX on the file(s):
(biblatex)                example1-blx.aux
(biblatex)                example2-blx.aux
(biblatex)                example3-blx.aux
(biblatex)                and rerun LaTeX afterwards.
```

Apart from these aux files, `biblatex` uses an additional `bib` file with the same suffix to pass certain parameters to BibTeX. In the example above, this file would be named `example-blx.bib`. In the event of a file name conflict, you can change the suffix by redefining the macro `\blxauxsuffix` in the document preamble. Note that `biblatex` will not overwrite any files it did not create. All auxiliary files created automatically by this package contain a special signature line. Before overwriting a file (excluding the main aux file, which is managed by LaTeX), `biblatex` inspects the first line of the file to make sure that there is no file name conflict. If the file in question is missing the signature line, `biblatex` will immediately issue an error message and abort before opening the output stream. In this case you should delete any spurious files accidentally left in the working directory. If the error persists, there may be a file name conflict with a file found in one of the TeX installation trees. Since the installation trees usually do not contain any aux files and the string `-blx` is fairly exotic in the name of a `bib` file, this is rather

¹ That is, unless the `defernums` package option is enabled. This option requires two LaTeX runs after the data has been exported to the `bb1` file by BibTeX.

unlikely but theoretically possible. If you find out that this is indeed the case, you should redefine `\blxauxsuffix` permanently in the `biblatex` configuration file, `biblatex.cfg`.

3.10.3 Multiple bibliographies

In a collection of articles by different authors, such as a conference proceedings volume for example, it is very common to have one bibliography for each article rather than a global one for the entire book. In the example below, each article would be presented as a separate `\chapter` with its own bibliography. Note that `biblatex` creates one additional aux file for every `refsection` environment. These files have to be processed by BibTeX as well, see section 3.10.2 for details.

```
\documentclass{...}
\usepackage{biblatex}
\bibliography{...}
\begin{document}
\chapter{...}
\begin{refsection}
...
\printbibliography
\end{refsection}
\chapter{...}
\begin{refsection}
...
\printbibliography
\end{refsection}
\end{document}
```

If `\printbibliography` is used inside a `refsection` environment, it automatically restricts the scope of the list of references to the enclosing `refsection` environment. For a cumulative bibliography which is subdivided by chapter but printed at the end of the book, use the `section` option of `\printbibliography` to select a reference section, as shown in the next example.

```
\documentclass{...}
\usepackage{biblatex}
\defbibheading{bibliography}{%
  \section*{References for Chapter \ref{refsection:\therefsection}}}
\bibliography{...}
\begin{document}
\chapter{...}
\begin{refsection}
...
\end{refsection}
\chapter{...}
\begin{refsection}
...
\end{refsection}
\chapter{References}
\printbibliography[section=1]
```

```
\printbibliography[section=2]
\end{document}
```

Note the definition of the bibliography heading in the above example. This is the definition taking care of the subheadings in the bibliography. The main heading is generated with a plain `\chapter` command in this case. The `biblatex` package automatically sets a label at the beginning of every `refsection` environment, using the standard `\label` command. The identifier used is the string `refsection:` followed by the number of the respective `refsection` environment. The number of the current section is accessible via the `refsection` counter. When using the `section` option of `\printbibliography`, this counter is also set locally. This means that you may use the counter in heading definitions to print subheadings like “References for Chapter 3”, as shown above. You could also use the title of the respective chapter as a subheading by loading the `nameref` package and using `\nameref` instead of `\ref`:

```
\usepackage{nameref}
\defbibheading{bibliography}{%
  \section*{\nameref{refsection:\therefsection}}}
```

Since giving one `\printbibliography` command for each part of a subdivided bibliography is tedious, `biblatex` provides a shorthand. The `\bibbysection` command automatically loops over all reference sections. This is equivalent to giving one `\printbibliography` command for every section but has the additional benefit of automatically skipping sections without references. In the example above, the bibliography would then be generated as follows:

```
\chapter{References}
\bibbysection
```

When using a format with one cumulative bibliography subdivided by chapter (or any other document division) it may be more appropriate to use `refsegment` rather than `refsection` environments. The difference is that the `refsection` environment generates labels local to the environment while `refsegment` does not affect the generation of labels, hence they will be unique across the entire document. Note that `refsegment` environments do not require additional aux files. The next example could also be given in section 3.10.4 because, visually, it creates one global bibliography subdivided into multiple segments.

```
\documentclass{...}
\usepackage{biblatex}
\defbibheading{bibliography}{%
  \section*{References for Chapter \ref{refsegment:\therefsegment}}
}
\bibliography{...}
\begin{document}
\chapter{...}
\begin{refsegment}
...
\end{refsegment}
\chapter{...}
```

```

\begin{refsegment}
...
\end{refsegment}
\chapter{References}
\printbibliography[segment=1]
\printbibliography[segment=2]
\end{document}

```

The use of `refsegment` is similar to `refsection` and there is also a corresponding `segment` option for `\printbibliography`. The `biblatex` package automatically sets a label at the beginning of every `refsegment` environment using the string `refsegment:` followed by the number of the respective `refsegment` environment as an identifier. There is a matching `refsegment` counter which may be used in heading definitions, as shown above. As with reference sections, there is also a shorthand command which automatically loops over all reference segments:

```

\chapter{References}
\bibbysegment

```

This is equivalent to giving one `\printbibliography` command for every segment.

3.10.4 Subdivided bibliographies

It is very common to subdivide a bibliography by certain criteria. For example, you may want to list printed and online resources separately or divide a bibliography into primary and secondary sources. The former case is straightforward because you can use the entry type as a criterion for the `type` and `notttype` filters of `\printbibliography`. The next example also demonstrates how to generate matching subheadings for the two parts of the bibliography.

```

\documentclass{...}
\usepackage{biblatex}
\defbibheading{printed}{\section*{Printed references}}
\defbibheading{online}{\section*{Online references}}
\bibliography{...}
\begin{document}
...
\chapter{References}
\printbibliography[heading=printed,notttype=online]
\printbibliography[heading=online,type=online]
\end{document}

```

You may also use more than two subdivisions:

```

\chapter{References}
\printbibliography[type=article]
\printbibliography[type=book]
\printbibliography[notttype=article,notttype=book]

```

It is even possible to give a chain of different types of filters:

```

\printbibliography[section=2,type=book,keyword=abc,notkeyword=xyz]

```

This would print all works cited in reference section 2 whose entry type is @book and whose keywords field includes the keyword ‘abc’ but not ‘xyz’. When using bibliography filters in conjunction with a numeric style, see section 3.II.4. If you need complex filters with conditional expressions, use the filter option in conjunction with a custom filter defined with \defbibfilter. See section 3.5.8 for details on custom filters.

```
\documentclass{...}
\usepackage{biblatex}
\defbibheading{primary}{\section*{Primary Sources}}
\defbibheading{secondary}{\section*{Secondary Sources}}
\bibliography{...}
\begin{document}
...
\chapter{Bibliography}
\printbibliography[heading=primary,keyword=primary]
\printbibliography[heading=secondary,keyword=secondary]
\end{document}
```

Dividing a bibliography into primary and secondary sources is possible with a keyword filter, as shown in the above example. In this case, with only two subdivisions, it would be sufficient to use one keyword as filter criterion:

```
\chapter{Bibliography}
\printbibliography[heading=primary,keyword=primary]
\printbibliography[heading=secondary,notkeyword=primary]
```

Since biblatex has no way of knowing if an item in the bibliography is considered to be primary or secondary literature, we need to supply the bibliography filter with the required data by adding a keywords field to each entry in the bib file. These keywords may then be used as targets for the keyword and notkeyword filters, as shown above. It may be a good idea to add such keywords right away while building a bib file.

```
@Book{key,
  keywords = {primary,some,other,keywords},
  ...}
```

An alternative way of subdividing the list of references are bibliography categories. They differ from the keywords-based approach shown in the example above in that they work on the document level and do not require any changes to the bib file.

```
\documentclass{...}
\usepackage{biblatex}
\DeclareBibliographyCategory{primary}
\DeclareBibliographyCategory{secondary}
\addtocategory{primary}{key1,key3,key6}
\addtocategory{secondary}{key2,key4,key5}
\defbibheading{primary}{\section*{Primary Sources}}
\defbibheading{secondary}{\section*{Secondary Sources}}
\bibliography{...}
```

```

\begin{document}
...
\chapter{Bibliography}
\printbibliography[heading=primary,category=primary]
\printbibliography[heading=secondary,category=secondary]
\end{document}

```

In this case it would also be sufficient to use one category only:

```

\chapter{References}
\printbibliography[heading=primary,category=primary]
\printbibliography[heading=secondary,notcategory=primary]

```

It is still a good idea to declare all categories used in the bibliography explicitly because there is a `\bibbycategory` command which automatically loops over all categories. This is equivalent to giving one `\printbibliography` command for every category, in the order in which they were declared.

```

\documentclass{...}
\usepackage{biblatex}
\DeclareBibliographyCategory{primary}
\DeclareBibliographyCategory{secondary}
\addtocategory{primary}{key1,key3,key6}
\addtocategory{secondary}{key2,key4,key5}
\defbibheading{primary}{\section*{Primary Sources}}
\defbibheading{secondary}{\section*{Secondary Sources}}
\bibliography{...}
\begin{document}
...
\chapter{Bibliography}
\bibbycategory
\end{document}

```

The handling of the headings is different from `\bibbysection` and `\bibbysegment` in this case. `\bibbycategory` uses the name of the current category as a heading name. This is equivalent to passing `heading=<category>` to `\printbibliography` and implies that you need to provide a matching heading for every category.

3.10.5 Reference sets

A reference set is a group of entries which are cited as a single reference and listed as a single item in the bibliography. Using an example borrowed from the `mcite` manual, the following three references

- [1] Sheldon Glashow. *Partial Symmetries of Weak Interactions*. In: *Nucl. Phys.* 22 (1961), pp. 579 sqq.
- [2] Abdus Salam. *Weak and Electromagnetic Interactions*. In: *Elementary particle theory. Relativistic groups and analyticity*. Proceedings of the Eighth Nobel Symposium, May 19–25, 1968. Ed. by Nils Svartholm. Stockholm: Almqvist & Wiksell, 1968, pp. 367 sqq.

[3] Steven Weinberg. *A Model of Leptons*. In: *Phys. Rev. Lett.* 19 (1967), pp. 1264 sqq.

would be concatenated into a single reference as follows:

[1] Sheldon Glashow. *Partial Symmetries of Weak Interactions*. In: *Nucl. Phys.* 22 (1961), pp. 579 sqq.; Abdus Salam. *Weak and Electromagnetic Interactions*. In: *Elementary particle theory. Relativistic groups and analyticity*. Proceedings of the Eighth Nobel Symposium, May 19–25, 1968. Ed. by Nils Svartholm. Stockholm: Almquist & Wiksell, 1968, pp. 367 sqq.; Steven Weinberg. *A Model of Leptons*. In: *Phys. Rev. Lett.* 19 (1967), pp. 1264 sqq.

Reference sets are defined in the bib file, essentially like any other entry. They require the `entryset` and `crossref` fields to be used in a particular way. The entries which make up the set are given as a comma-separated list of entry keys in the `entryset` field of the parent entry. The remaining data of the `@set` entry must be identical to the data of the first item in the set. The easiest way to accomplish that is to use a `crossref` field which points to the first key listed in the `entrykey` field. The `entryset` fields of the child entries are reverse pointers to the entry key of the parent. Here is an example of a reference set consisting of three items:

```
@Set{set1,
  entryset = {key1,key2,key3},
  crossref = {key1},
}
@Article{key1,
  entryset = {set1},
  author   = {...},
  title    = {...},
  ...
}
@Article{key2,
  entryset = {set1},
  author   = {...},
  title    = {...},
  ...
}
@Article{key3,
  entryset = {set1},
  author   = {...},
  title    = {...},
  ...
}
```

If you want to refer to an item as part of a set in one document and as a stand-alone reference in a different one (or in a different reference section of the same document), you need two distinct entries. You may use `crossref` fields to avoid duplicating all the data but keep in mind that BibTeX does not support cascading cross-references and that `entryset` fields will be inherited with the rest of the data as BibTeX copies the data of the cross-referenced parent entry. To avoid that, use

an empty entryset field in the entry serving as a stand-alone reference. The setup boils down to this:

```
@Set{set1,  
  entryset = {subkey1,...},  
  crossref = {subkey1},  
}  
@Article{key1,  
  entryset = {},  
  crossref = {subkey1},  
}  
@Article{subkey1,  
  entryset = {set1},  
  author   = {...},  
  title    = {...},  
  ...  
}
```

In the above example, use the key ‘set1’ when citing the entire reference set (including subkey1) and ‘key1’ when citing the article as a stand-alone reference. Style authors should also see section [4.10.2](#) for further information.

3.10.6 Electronic publishing information

There are two fields which hold electronic publishing information, eprint and eprinttype. The eprint field is a verbatim field similar to doi which holds the identifier of the item. The optional eprinttype field may be used to record a resource name, i. e., the name of the site or electronic archive:

```
@Online{...,  
  eprint      = {identifier},  
  eprinttype = {Resource},  
  ...  
}
```

If the eprinttype field is available, the standard styles will use it as a literal label. With the above example, they would print “Resource: identifier” rather than the generic “eprint: identifier”. The standard styles also feature dedicated support for arXiv references. For arXiv references, put the identifier in the eprint field and the string arxiv (all lowercase) in the eprinttype field:

```
@Online{...,  
  eprint      = {0706.0001},  
  eprinttype = {arxiv},  
  ...  
}
```

For papers submitted prior to April 1, 2007, which use the old arXiv identifier scheme, include all classification information such as the archive name and the subject class in the eprint field:

```
@Online{...,  
  eprint      = {hep-th/9603067},  
  ...  
}
```

```
@Online{...,
  eprint      = {math.GT/0309136},
  ...
}
```

If hyperlinks are enabled, the `eprint` field will be transformed into a link to `arxiv.org`. See the package option `arxiv` in section 3.1.2 for further details. Also see section 4.10.5 on how to add dedicated support for other eprint resources.

3.10.7 External abstracts and annotations

Styles which print the fields `abstract` and/or `annotation` may support an alternative way of adding abstracts or annotations to the bibliography. Instead of including the text in the `bib` file, it may also be stored in an external LaTeX file. For example, instead of saying

```
@Article{key1,
  ...
  abstract      = {This is an abstract of entry 'key1'.}
}
```

in the `bib` file, you may create a file named `bibabstract-key1.tex` and put the abstract in this file:

```
This is an abstract of entry 'key1'.
\endinput
```

The name of the external file must be the entry key prefixed with `bibabstract-` or `bibannotation-`, respectively. You can change these prefixes by redefining `\bibabstractprefix` and `\bibannotationprefix`. Note that this feature needs to be enabled explicitly by setting the package option `loadfiles` from section 3.1.2. The option is disabled by default for performance reasons. Also note that any `abstract` and `annotation` fields in the `bib` file take precedence over the external files. Using external files is strongly recommended if you have long abstracts or a lot of annotations since this may increase memory requirements significantly. It is also more convenient to edit the text in a dedicated LaTeX file. Style authors should see section 4.10.6 for further information.

3.11 Hints and caveats

This section provides additional usage hints and addresses some common problems and potential misconceptions.

3.11.1 Usage with KOMA-Script classes

When using `biblatex` in conjunction with one of the `scrbook`, `scrreprt`, or `scrartcl` classes, the headings `bibliography` and `shorthands` from section 3.5.6 are responsive to the bibliography-related options of these classes.¹ You can over-

¹ This applies to the traditional syntax of these options (`bibtotoc` and `bibtotocnumbered`) as well as to the `\langle key \rangle = \langle value \rangle` syntax introduced in KOMA-Script 3.x, i. e., to `bibliography=nottotoc`, `bibliography=totoc`, and `bibliography=totocnumbered`, but only if these options are set globally in the optional argument to `\documentclass`.

ride the default headings by using the heading option of `\printbibliography` and `\printshorthands`. See sections 3.5.1, 3.5.2, and 3.5.6 for details. All default headings are adapted at load-time such that they blend with the behavior of these classes. If one of the above classes is detected, `biblatex` will also provide the following additional tests which may be useful in custom heading definitions:

```
\ifkomabibtotoc{<true>}{<false>}
```

Expands to `<true>` if the class option `bibtotoc` or `bibtotocnumbered` has been set, and to `<false>` otherwise. This also applies to the new syntax `bibliography=totoc` and `bibliography=totocnumbered`, but only if the options are set globally in the optional argument to `\documentclass`.

```
\ifkomabibtotocnumbered{<true>}{<false>}
```

Expands to `<true>` if the class option `bibtotocnumbered` has been set, and to `<false>` otherwise. This also applies to the new syntax `bibliography=totocnumbered`, but only if the option is set globally in the optional argument to `\documentclass`.

3.11.2 Usage with the Memoir class

When using `biblatex` with the `memoir` class, most class-specific facilities for adapting the bibliography have no effect. Use the corresponding facilities of this package instead. See sections 3.5.1, 3.5.2, 3.5.6, and 3.5.7 for details. Instead of redefining `memoir`'s `\bibsection`, use the heading option of `\printbibliography` and `\printshorthands` (3.5.1, 3.5.2) in conjunction with `\defbibheading` (3.5.6). Instead of `\prebibhook` and `\postbibhook`, use the `prenote` and `postnote` options of `\printbibliography` and `\printshorthands` (3.5.1, 3.5.2) in conjunction with `\defbibnote` (3.5.7). All default headings are adapted at load-time such that they blend well with the default layout of this class. The default headings `bibliography` and `shorthands` (3.5.6) are also responsive to `memoir`'s `\bibintoc` and `\nobibintoc` switches. The length register `\bibitemsep` is used by `biblatex` in a way similar to `memoir`, see section 3.8.3 for details. This section also introduces some additional length registers which correspond to `memoir`'s `\biblistextra`. Lastly, `\setbiblabel` does not map to a single facility of the `biblatex` package since the style of all labels in the bibliography is controlled by the `bibliography` style. See section 4.2.2 in the author section of this manual for details. If the `memoir` class is detected, `biblatex` will also provide the following additional test which may be useful in custom heading definitions:

```
\ifmemoirbibintoc{<true>}{<false>}
```

Expands to `<true>` or `<false>`, depending on `memoir`'s `\bibintoc` and `\nobibintoc` switches. This is a LaTeX frontend to `memoir`'s `\ifnobibintoc` test. Note that the logic of the test is reversed.

3.11.3 Page numbers in citations

If the `<postnote>` argument to a citation command is a page number or page range, `biblatex` will automatically prefix it with 'p.' or 'pp.' by default. This works reliably in typical cases, but sometimes manual intervention may be required. In this

case, it is important to understand how this argument is handled in detail. First, `biblatex` checks if the postnote is an Arabic or Roman numeral (case insensitive). If this test succeeds, the postnote is considered as a single page or other number which will be prefixed with ‘p.’ or some other string which depends on the pagination field (see section 2.3.9). If it fails, a second test is performed to find out if the postnote is a range or a list of Arabic or Roman numerals. If this test succeeds, the postnote will be prefixed with ‘pp.’ or some other string in the plural form. If it fails as well, the postnote is printed as is. Note that both tests expand the $\langle postnote \rangle$. All commands used in this argument must therefore be robust or prefixed with `\protect`. Here are a few examples of $\langle postnote \rangle$ arguments which will be correctly recognized as a single number, a range of numbers, or a list of numbers, respectively:

```
\cite[25]{key}
\cite[vii]{key}
\cite[XIV]{key}
\cite[34--38]{key}
\cite[iv--x]{key}
\cite[185/86]{key}
\cite[XI \& XV]{key}
\cite[3, 5, 7]{key}
\cite[vii--x; 5, 7]{key}
```

In some other cases, however, the tests may get it wrong and you need to resort to the auxiliary commands `\pno`, `\ppno`, and `\nopp` from section 3.6.8. For example, suppose a work is cited by a special pagination scheme consisting of numbers and letters. In this scheme, the string ‘27a’ would mean ‘page 27, part a’. Since this string does not look like a number or a range to `biblatex`, you need to force the prefix for a single number manually:

```
\cite[\pno-27a]{key}
```

There is also a `\ppno` command which forces a range prefix as well as a `\nopp` command which suppresses all prefixes:

```
\cite[\ppno-27a--28c]{key}
\cite[\nopp 25]{key}
```

These commands may be used anywhere in the $\langle postnote \rangle$ argument. They may also be used multiple times. For example, when citing by volume and page number, you may want to suppress the prefix at the beginning of the postnote and add it in the middle of the string:

```
\cite[VII, \pno-5]{key}
\cite[VII, \pno-3, \ppno-40--45]{key}
\cite[see][\ppno-37--46, in particular \pno-40]{key}
```

There are also two auxiliary command for suffixes like ‘the following page(s)’. Instead of inserting such suffixes literally (which would require `\ppno` to force a prefix):

```
\cite[\ppno-27~sq.]{key}
```

```
\cite[\ppno-55~sqq.]{key}
```

use the auxiliary commands `\psq` and `\psqq`. Note that there is no space between the number and the command. This space will be inserted automatically and may be modified by redefining the macro `\sqsqspace`.

```
\cite[27\psq]{key}
```

```
\cite[55\psqq]{key}
```

Since the postnote is printed without any prefix if it includes any character which is not an Arabic or Roman numeral, you may also type the prefix manually:

```
\cite[p.~5]{key}
```

It is possible to suppress the prefix on a per-entry basis by setting the pagination field of an entry to ‘none’, see section 2.3.9 for details. If you do not want any prefixes at all or prefer to type them manually, you can also disable the entire mechanism in the document preamble or the configuration file as follows:

```
\DeclareFieldFormat{postnote}{#1}
```

The `<postnote>` argument is handled as a field and the formatting of this field is controlled by a field formatting directive which may be freely redefined. The above definition will simply print the postnote as is. See sections 4.3.2 and 4.4.2 in the author guide for further details.

3.11.4 Bibliography filters and citation labels

The citation labels generated by this package are assigned to the full list of references before it is split up by any bibliography filters. They are guaranteed to be unique across the entire document (or a refsection environment), no matter how many bibliography filters you are using. When using a numeric citation scheme, however, this will most likely lead to discontinuous numbering in split bibliographies. Use the `defernums` package option to avoid this problem. If this option is enabled, numeric labels are assigned the first time an entry is printed in any bibliography.

3.11.5 Active characters in bibliography headings

Packages using active characters, such as `babel`, `csquotes`, or `underscore`, usually do not make them active until the beginning of the document body to avoid interference with other packages. A typical example of such an active character is the Ascii quote `"`, which is used by various language modules of the `babel` package. If shorthands such as `"<` and `"a` are used in the argument to `\defbibheading` and the headings are defined in the document preamble, the non-active form of the characters is saved in the heading definition. When the heading is typeset, they do not function as a command but are simply printed literally. The most straightforward solution consists in moving `\defbibheading` after `\begin{document}`. Alternatively, you may use `babel`'s `\shorthandon` and `\shorhandoff` commands to temporarily make the shorthands active in the preamble. The above also applies to bibliography notes and the `\defbibnote` command.

3.11.6 Grouping in reference sections and segments

All LaTeX environments enclosed in `\begin` and `\end` form a group. This may have undesirable side effects if the environment contains anything that does not expect to be used within a group. This issue is not specific to `refsection` and `refsegment` environments, but it obviously applies to them as well. Since these environments will usually enclose much larger portions of the document than a typical `itemize` or similar environment, they are simply more likely to trigger problems related to grouping. If you observe any malfunctions after adding `refsection` environments to a document (for example, if anything seems to be ‘trapped’ inside the environment), try the following syntax instead:

```
\chapter{...}  
\refsection  
...  
\endrefsection
```

This will not form a group, but otherwise works as usual. As far as `biblatex` is concerned, it does not matter which syntax you use. The alternative syntax is also supported by the `refsegment` environment. Note that the commands `\newrefsection` and `\newrefsegment` do not form a group. See sections 3.5.3 and 3.5.4 for details.

4 Author guide

This part of the manual documents the author interface of the `biblatex` package. The author guide covers everything you need to know in order to write new citation and bibliography styles or localization modules. You should read the user guide first before continuing with this part of the manual.

4.1 Overview

Before we get to the commands and facilities provided by `biblatex`, we will have a look at some of its fundamental concepts. The `biblatex` package interacts with BibTeX in a way that is somewhat different from the traditional way of doing things. Most notably, the `bb1` file is used differently and there is only one `bst` file which implements a structured data interface rather than exporting printable data. With LaTeX’s standard bibliographic facilities, a document includes any number of citation commands in the document body plus `\bibliographystyle` and `\bibliography`, usually towards the end of the document. The location of the former is arbitrary, the latter marks the spot where the list of references is to be printed:

```
\documentclass{...}  
\begin{document}  
\cite{...}  
...  
\bibliographystyle{...}  
\bibliography{...}  
\end{document}
```

Processing this files requires that a certain procedure be followed. This procedure is as follows:

1. Run `latex`: On the first run, `\bibstyle` and `\bibdata` commands are written to the aux file, along with `\citation` commands for all citations. At this point, the references are undefined because LaTeX is waiting for BibTeX to supply the required data. There is also no bibliography yet.
2. Run `bibtex`: BibTeX writes a `thebibliography` environment to the `bb1` file, supplying all entries from the `bib` file which were requested by the `\citation` commands in the aux file.
3. Run `latex`: Starting with the second run, the `\bibitem` commands in the `thebibliography` environment write one `\bibcite` command for each bibliography entry to the aux file. These `\bibcite` commands define the citation labels used by `\cite`. However, the references are still undefined because the labels are not available until the end of this run.
4. Run `latex`: Starting with the third run, the citation labels are defined as the aux file is read in at the end of the preamble. All citations can now be printed.

Note that all bibliographic data is written to the `bb1` file in the final format. The `bb1` file is read in and processed like any printable section of the document. For example, consider the following entry in a `bib` file:

```
@Book{companion,
  author   = {Michel Goossens and Frank Mittelbach and Alexander Samarin},
  title    = {The LaTeX Companion},
  publisher = {Addison-Wesley},
  address  = {Reading, Mass.},
  year     = {1994},
}
```

With the `plain.bst` style, BibTeX exports this entry to the `bb1` file as follows:

```
\bibitem{companion}
Michel Goossens, Frank Mittelbach, and Alexander Samarin.
\newblock {\em The LaTeX Companion}.
\newblock Addison-Wesley, Reading, Mass., 1994.
```

By default, LaTeX generates numeric citation labels, hence `\bibitem` writes lines such as the following to the aux file:

```
\bibcite{companion}{1}
```

Implementing a different citation style implies that more data has to be transferred via the aux file. With the `natbib` package, for example, the aux file contains lines like this one:

```
\bibcite{companion}{{1}{1994}{{Goossens et-al.}}{Goossens, Mittelbach,
and Samarin}}
```

The `biblatex` package supports citations in any arbitrary format, hence citation commands need access to all bibliographic data. What this would mean within

tation of the bibliographic data. Just like an aux file, this bbl file does not print anything when read in. It merely puts data in memory.

3. Run latex: Starting with the second run, the bbl file is processed right at the beginning of the document body, just like an aux file. From this point on, all bibliographic data is available in memory so that all citations can be printed right away.¹ The citation commands have access to the complete bibliographic data, not only to a predefined label. The bibliography is generated from memory using the same data and may be filtered or split as required.

Let's consider the sample entry given above once more:

```
@Book{companion,
  author   = {Michel Goossens and Frank Mittelbach and Alexander Samarin},
  title    = {The LaTeX Companion},
  publisher = {Addison-Wesley},
  address  = {Reading, Mass.},
  year     = {1994},
}
```

With biblatex, this entry is essentially exported in the following format:

```
\entry{companion}{book}{}
  \name{author}{3}{%
    {Goossens}{G.}{Michel}{M.}{}{}{}{}{}%
    {Mittelbach}{M.}{Frank}{F.}{}{}{}{}{}%
    {Samarin}{S.}{Alexander}{A.}{}{}{}{}{}%
  }
  \list{publisher}{1}{%
    {Addison-Wesley}%
  }
  \list{location}{1}{%
    {Reading, Mass.}%
  }
  \field{title}{The LaTeX Companion}
  \field{year}{1994}
\endentry
```

As you can see, the data is presented in a structured format that resembles the structure of a bib file to some extent. At this point, no decision concerning the final format of the bibliography entry has been made. The formatting of the bibliography and all citations is controlled by LaTeX macros, which are defined in bibliography and citation style files.

4.2 Bibliography styles

A bibliography style is a set of macros which print the entries in the bibliography. Such styles are defined in files with the suffix bbx. The biblatex package loads

¹ If the defernums package option is enabled biblatex uses an algorithm similar to the traditional procedure to generate numeric labels. In this case, the numbers are assigned as the bibliography is printed and then cycled through the aux file. It will take an additional LaTeX run for them to be picked up in citations.

the selected bibliography style file at the end of the package. Note that a small repertory of frequently used macros shared by several of the standard bibliography styles is included in `biblatex.def`. This file is loaded at the end of the package as well, prior to the selected bibliography style.

4.2.1 Bibliography style files

Before we go over the individual components of a bibliography style, consider this example of the overall structure of a typical `bbx` file:

```
\ProvidesFile{example.bbx}[2006/03/15 v1.0 biblatex bibliography style]

\renewenvironment*{thebibliography}{...}{...}
\renewenvironment*{theshorthands}{...}{...}
\renewcommand*{\thebibitem}{...}
\renewcommand*{\thelositem}{...}

\InitializeBibliographyStyle{...}
\DeclareBibliographyDriver{article}{...}
\DeclareBibliographyDriver{book}{...}
\DeclareBibliographyDriver{inbook}{...}
...
\DeclareBibliographyDriver{shorthands}{...}
\endinput
```

The main structure of a bibliography style file consists of the following commands:

`\RequireBibliographyStyle{<style>}`

This command is optional and intended for specialized bibliography styles built on top of a more generic style. It loads the bibliography style `style.bbx`.

`\InitializeBibliographyStyle{<code>}`

Specifies arbitrary `<code>` to be inserted at the beginning of the bibliography, but inside the group formed by the bibliography. This command is optional. It may be useful for definitions which are shared by several bibliography drivers but not used outside the bibliography. Keep in mind that there may be several bibliographies in a document. If the bibliography drivers make any global assignments, they should be reset at the beginning of the next bibliography.

`\DeclareBibliographyDriver{<type>}{<code>}`

Defines a bibliography driver. A ‘driver’ is a macro which handles a specific entry type. The `<type>` corresponds to the entry type used in `bib` files, specified in lower-case letters (see section 2.1). Note that the type `shorthands` has a special meaning. The `shorthands` driver handles all entries in the list of shorthands. The `<code>` is arbitrary code which typesets all bibliography entries of the respective `<type>`. This command is mandatory. Every bibliography style must provide one driver for every entry type. These drivers are the core of every bibliography style.

`\DeclareBibliographyAlias{<alias>}{<type>}`

If a bibliography driver covers more than one entry type, this command may be used to define an alias. This command is optional.

`\DeclareBibliographyOption{<key>}[<value>]{<code>}`

This command defines additional preamble options in `<key>=<value>` format. The `<key>` is the option key. The `<code>` is arbitrary TeX code to be executed whenever the option is used. The value passed to the option is passed on to the `<code>` as #1. The optional `<value>` is a default value to be used if the bare key is given without any value. This is useful for boolean switches. For example, with a definition like the following:

```
\DeclareBibliographyOption{somekey}[true]{...}
```

giving ‘somekey’ without a value is equivalent to ‘somekey=true’.

`\DeclareEntryOption{<key>}[<value>]{<code>}`

Similar to `\DeclareBibliographyOption` but defines options which are settable on a per-entry basis in the options field from section 2.2.3. The `<code>` will be executed whenever `biblatex` prepares the data of the entry for use by a citation command or a bibliography driver.

4.2.2 Bibliography environments

Apart from defining bibliography drivers, the bibliography style is also responsible for the commands `\thebibitem` and `\thelositem` as well as the corresponding environments `thebibliography` and `theshorthands`. With `biblatex`, these commands and environments are released from any responsibilities which are not related to typesetting the actual reference lists. They do not need to write any data to the aux file and they do not handle the heading of the bibliography or any pre- or postnotes. You may redefine them freely. The environment `thebibliography` controls the layout of the bibliography, the corresponding `\thebibitem` command is executed at the start of every bibliography entry inside this environment. Here is a definition suitable for a bibliography style which does not print any labels in the bibliography:

```
\renewenvironment*{thebibliography}
  {\list
   {}
   {\setlength{\leftmargin}{\bibhang}%
    \setlength{\itemindent}{-\leftmargin}%
    \setlength{\itemsep}{\bibitemsep}%
    \setlength{\parsep}{\bibparsep}}
  {\endlist}
\renewcommand*{\thebibitem}{\item}
```

This definition employs a `list` environment with hanging indentation, using the `\bibhang` length register provided by `biblatex`. It allows for a certain degree of configurability by using `\bibitemsep` and `\bibparsep`, two length registers

provided by biblatex for this very purpose (see section 4.9.3). Since we are using a list environment, we redefine `\thebibitem` such that it expands to `\item`. The author-year and author-title bibliography styles use a definition similar to this example.

```
\renewenvironment*{thebibliography}
  {\list
    {\printfield[labelnumberwidth]{labelnumber}}
    {\setlength{\labelwidth}{\labelnumberwidth}%
     \setlength{\leftmargin}{\labelwidth}%
     \setlength{\labelsep}{\biblabelsep}%
     \addtolength{\leftmargin}{\labelsep}%
     \setlength{\itemsep}{\bibitemsep}%
     \setlength{\parsep}{\bibparsep}}%
    \renewcommand*{\makelabel}[1]{\hss##1}}
  {\endlist}
\renewcommand*{\thebibitem}{\item}
```

Some bibliography styles print labels in the bibliography. For example, a bibliography style designed for a numeric citation scheme will print the number of every entry such that the bibliography looks like a numbered list. In the first example, the first argument to `\list` was empty. In this example, we need it to insert the number, which is provided by biblatex in the `labelnumber` field. We also employ several length registers and other facilities provided by biblatex, see sections 4.9.4 and 4.9.5 for details. The numeric bibliography style uses the definition given above. The alphabetic style is similar, except that `labelnumber` is replaced by `labelalpha` and `labelnumberwidth` by `labelalphawidth`.

The list of shorthands is typeset in a similar way. The layout of the list is controlled by the environment `theshorthands`, the corresponding `\thelositem` command is executed at the start of every entry inside this environment. A typical example is given below. See sections 4.9.4 and 4.9.5 for details on the length registers and facilities used in this example.

```
\renewenvironment*{theshorthands}
  {\list
    {\printfield[shorthandwidth]{shorthand}}
    {\setlength{\labelwidth}{\shorthandwidth}%
     \setlength{\leftmargin}{\labelwidth}%
     \setlength{\labelsep}{\biblabelsep}%
     \addtolength{\leftmargin}{\labelsep}%
     \setlength{\itemsep}{\bibitemsep}%
     \setlength{\parsep}{\bibparsep}%
     \renewcommand*{\makelabel}[1]{##1\hss}}
  {\endlist}
```

The definitions of `thebibliography` and `theshorthands` need not be based on a list environment. For example, it is possible to typeset the entire bibliography as one paragraph. This compact format is sometimes used for short reading lists, for example in encyclopedias.

```
\renewenvironment*{thebibliography}
```

```

{\interlinepenalty0\relax}
{}
\renewcommand*\thebibitem{%
\renewcommand*\thebibitem{\addnbspace\textendash\space}}

```

In this case, the `thebibliography` environment does nothing except making sure that the `\interlinepenalty` is set to a suitable value. `\thebibitem` does not insert `\item` but a dash separated from the text by interword spaces. As mentioned above, `\thebibitem` is executed at the start of every entry. Since we only want a separator between items, but not in front of the first item, we define `\thebibitem` such that it redefines itself when executed for the first time and only prints the separator when subsequently executed.

4.2.3 Bibliography drivers

Before we go over the commands which form the data interface of the `biblatex` package, it may be instructive to have a look at the structure of a bibliography driver. Note that the example given below is greatly simplified, but still functional. For the sake of readability, we omit several fields which may be part of a `@book` entry and also simplify the handling of those which are considered. The main point is to give you an idea of how a driver is structured. For information about the mapping of BibTeX's fields to `biblatex`'s data types, see section 2.2.

```

\DeclareBibliographyDriver{book}{%
\printnames{author}%
\newunit\newblock
\printfield{title}%
\newunit\newblock
\printlist{publisher}%
\newunit
\printlist{location}%
\newunit
\printfield{year}%
\finentry}

```

At this point, there is still one piece missing: the formatting directives used by `\printnames`, `\printlist`, and `\printfield`. To give you an idea of what a formatting directive looks like, here are some fictional ones used by our sample driver. Field formats are straightforward, the value of the field is passed to the formatting directive as an argument which may be formatted as desired. The following directive will simply wrap its argument in an `\emph` command:

```

\DeclareFieldFormat{title}{\emph{#1}}

```

List formats are slightly more complex. After splitting up the list into individual items, `biblatex` will execute the formatting directive once for every item in the list. The item is passed to the directive as an argument. The separator to be inserted between the individual items in the list is also handled by the corresponding directive, hence we have to check whether we are in the middle of the list or at the end when inserting it.

```

\DeclareListFormat{location}{%
  #1%
  \ifthenelse{\value{listcount}<\value{liststop}}
    {\addcomma\space}
    {}}

```

Formatting directives for names are similar to those for literal lists, but the individual items in the list are names which are automatically dissected into their components. The list formatting directive is executed once for each name in the list and the components of the name are passed to the formatting directive as separate arguments. For example, #1 is the last name and #3 is the first name. Here is a simplified example:

```

\DeclareNameFormat{author}{%
  \ifthenelse{\value{listcount}=1}
    {#1%
     \ifblank{#3}{}{\addcomma\space #3}}
    {\ifblank{#3}{}{#3\space}%
     #1}%
  \ifthenelse{\value{listcount}<\value{liststop}}
    {\addcomma\space}
    {}}

```

The above directive reverses the name of the first author (“Last, First”) and prints the remaining names in their regular sequence (“First Last”). Note that the only component which is guaranteed to be available is the last name, hence we have to check which parts of the name are actually present. If a certain component of a name is not available, the corresponding argument will be blank. As with directives for literal lists, the separator to be inserted between the individual items in the list is also handled by the formatting directive, hence we have to check whether we are in the middle of the list or at the end when inserting it. This is what the second `\ifthenelse` test does.

4.2.4 Special fields

The following lists and fields are used by `biblatex` to pass data to bibliography drivers and citation commands. They are not used in `bib` files but defined automatically by the package. From the perspective of a bibliography or citation style, they are not different from the fields in a `bib` file.

`entrykey` field (string)

The entry key of an item in the `bib` file. This is the string used by `biblatex` and `BibTeX` to identify an entry in the `bib` file.

`entrysetcount` field (integer)

This field is only available in the subentries of a set entry. It holds an integer indicating the position of a set member in the reference set (starting at 1).

`entrytype` field (string)

The entry type (`@book`, `@inbook`, etc.), given in lowercase letters.

labelalpha field (literal)

A label similar to the labels generated by the `alpha.bst` style of traditional BibTeX. This label consists of initials drawn from the `labelname` list plus the last two digits of the year field. The `label` field may be used to override its non-numeric portion. If the `label` field is defined, `biblatex` will use its value and append the last two digits of the year field when generating `labelalpha`. The `shorthand` field may be used to override the entire label. If defined, `labelalpha` is the shorthand rather than an automatically generated label. Note that a complete ‘alphabetic’ label consists of the fields `labelalpha` plus `extraalpha`. Also note that the `labelalpha` and `extraalpha` fields need to be requested with the package option `labelalpha`, see section 3.1.5 for details. See also `extraalpha` as well as `\labelalphaothers` in section 3.8.1.

extraalpha field (literal)

The ‘alphabetic’ citation scheme usually requires a letter to be appended to the label if the bibliography contains two or more works by the same author which were all published in the same year. In this case, the `extraalpha` field holds an integer which may be converted to a letter with `\mknumalph` or formatted in some other way. This field is similar to the role of `labelyear` in the author-year scheme. The field is undefined if there is only one work by the author in the bibliography or if all works by the author have different publication years. Note that a complete ‘alphabetic’ label consists of the fields `labelalpha` plus `extraalpha`. Also note that the `labelalpha` and `extraalpha` fields need to be requested with the package option `labelalpha`, see section 3.1.5 for details. See also `labelalpha` as well as `\labelalphaothers` in section 3.8.1.

labelname list (name)

The name to be printed in citations. This list is a copy of either the `shortauthor`, the `author`, the `shorteditor`, the `editor`, or the `translator` list, which are normally checked for in this order. If no authors and editors are available, this list is undefined. Note that this list is also responsive to the `useauthor`, `useeditor`, and `usetranslator` options, see section 3.1.4. Citation styles should use this list when printing the name in a citation. This list is provided for convenience only and does not carry any additional meaning.

labelnumber field (literal)

The number of the bibliography entry, as required by numeric citation schemes. If the shorthand field is used, `biblatex` does not assign a number to the respective entry. In this case `labelnumber` is the shorthand rather than a number. Numeric styles must use the value of this field instead of a counter. Note that this field needs to be requested with the package option `labelnumber`, see section 3.1.5 for details. Also see the package option `defernums` in section 3.1.2.

labeltitle field (literal)

The title to be printed in citations. If a short title is available, `labeltitle` is a copy

of the `shorttitle` field, otherwise `biblatex` falls back to the `title` field. Citation styles printing short titles may simply make use of this field instead of checking whether a `shorttitle` field is available every time they print a title. This field is provided for convenience only and does not carry any additional meaning.

`labelyear` field (integer)

The author-year citation scheme usually requires a letter to be appended to the year if the bibliography contains two or more works by the same author which were all published in the same year. In this case, the `labelyear` field holds an integer which may be converted to a letter with `\mknumalph` or formatted in some other way. This field is undefined if there is only one work by the author in the bibliography or if all works by the author have different publication years. Note that this field needs to be requested with the package option `labelyear`, see section 3.1.5 for details.

`namehash` field (string)

A unique hash string derived from the `labelname` list. This is intended for recurrence checks. For example, a citation style which replaces recurrent authors or editors with a string like ‘idem’ could save the `namehash` field with `\savefield` and use it in a comparison with `\iffieldequals` later (see sections 4.5.1 and 4.5.2). The `namehash` is derived from the truncated `labelname` list, i. e., it is responsive to the global `maxnames` and `minnames` options. It is automatically sanitized such that the hash may safely be used in the formation of control sequence names. It is not intended for printing. See also `fullhash`.

`fullhash` field (string)

Like `namehash`, this field is a unique hash string referring to the primary name of the entry. It differs from `namehash` in two respects: 1) The `shortauthor` and `shorteditor` lists are ignored when generating the hash. 2) It is always derived from the full list, ignoring the `maxnames` and `minnames` options. For example, with `maxnames=1`, the following two entries will have the same `namehash` but different `fullhash` values:

```
@Article{...,
  author = {Doe, John and Jones, Edward},
  ...

@Article{...,
  author = {Doe, John and Williams, Joe},
  ...
```

The `fullhash` field is automatically sanitized such that the hash may safely be used in the formation of control sequence names. It is not intended for printing. See also `namehash`.

`pageref` list (literal)

If the `backref` package option is enabled, this list holds the page numbers of the

pages on which the respective bibliography entry is cited. If there are refsection environments in the document, the back references are local to the reference sections.

`sortinit` field (literal)

This field holds the initial letter of the string used during sorting. This is useful when subdividing the bibliography alphabetically.

4.3 Citation styles

A citation style is a set of commands such as `\cite` which print different types of citations. Such styles are defined in files with the suffix `cbx`. The `biblatex` package loads the selected citation style file at the end of the package. Note that a small repertory of frequently used macros shared by several of the standard citation styles is also included in `biblatex.def`. This file is loaded at the end of the package as well, prior to the selected citation style. It also contains the definitions of the commands from section 3.6.5.

4.3.1 Citation style files

Before we go over the individual commands available in citation style files, consider this example of the overall structure of a typical `cbx` file:

```
\ProvidesFile{example.cbx}[2006/03/15 v1.0 biblatex citation style]

\DeclareCiteCommand{\cite}{...}{...}{...}{...}
\DeclareCiteCommand{\parencite}[\mkbibparens]{...}{...}{...}{...}
\DeclareCiteCommand{\footcite}[\mkbibfootnote]{...}{...}{...}{...}
\DeclareCiteCommand{\textcite}{...}{...}{...}{...}
\endinput
```

`\RequireCitationStyle{<style>}`

This command is optional and intended for specialized citation styles built on top of a more generic style. It loads the citation style `style.cbx`.

`\InitializeCitationStyle{<code>}`

Specifies arbitrary `<code>` required to initialize or reset the citation style. This hook will be executed once at package load-time and every time the `\citereset` command from section 3.6.8 is used. The `\citereset` command also resets the internal citation trackers of this package. The reset will affect the `\ifciteseen`, `\ifentryseen`, `\ifciteibid`, and `\ifciteidem` tests discussed in section 4.5.2. When used in a refsection environment, the reset of the citation tracker is local to the current refsection environment.

`\OnManualCitation{<code>}`

Specifies arbitrary `<code>` required for a partial reset of the citation style. This hook will be executed every time the `\mancite` command from section 3.6.8 is used. It is particularly useful in citation styles which replace repeated citations by

abbreviations like ‘ibidem’ or ‘op. cit.’ which may get ambiguous if automatically generated and manual citations are mixed. The `\mancite` command also resets the internal ‘ibidem’ and ‘idem’ trackers of this package. The reset will affect the `\ifciteibid` and `\ifciteidem` tests discussed in section 4.5.2.

```
\DeclareCiteCommand{<command>}[<wrapper>]{<precode>}{<loopcode>}{<sepcode>}{<postcode>}
\DeclareCiteCommand*{<command>}[<wrapper>]{<precode>}{<loopcode>}{<sepcode>}{<postcode>}
```

This is the core command used to define all citation commands. It takes one optional and five mandatory arguments. The `<command>` is the command to be defined, for example `\cite`. If the optional `<wrapper>` argument is given, the entire citation will be passed to the `<wrapper>` as an argument, i. e., the wrapper command must take one mandatory argument.¹ The `<precode>` is arbitrary code to be executed at the beginning of the citation. It will typically handle the `<prenote>` argument which is available in the `prenote` field. It may also be used to initialize macros required by the `<loopcode>`. The `<loopcode>` is arbitrary code to be executed for each entry key passed to the `<command>`. This is the core code which prints the citation labels or any other data. The `<sepcode>` is arbitrary code to be executed after each iteration of the `<loopcode>`. It will only be executed if a list of entry keys is passed to the `<command>`. The `<sepcode>` will usually insert some kind of separator, such as a comma or a semicolon. The `<postcode>` is arbitrary code to be executed at the end of the citation. The `<postcode>` will typically handle the `<postnote>` argument which is available in the `postnote` field.² The starred variant of `\DeclareCiteCommand` defines a starred `<command>`. For example, `\DeclareCiteCommand*{cite}` would define `\cite*`.³

```
\DeclareMultiCiteCommand{<command>}[<wrapper>]{<cite>}{<delimiter>}
```

This command defines ‘multicite’ commands, as discussed in section 3.6.3. The `<command>` is the multicite command to be defined, for example `\cites`. It is automatically made robust. Multicite commands are built on top of backend commands defined with `\DeclareCiteCommand` and the `<cite>` argument specifies the name of the backend command to be used. Note that the wrapper of the backend command (i. e., the `<wrapper>` argument passed to `\DeclareCiteCommand`) is ignored. Use the optional `<wrapper>` argument to specify an alternative wrapper. The `<delimiter>` is the string to be printed as a separator between the individual citations in the list. This will typically be `\multicitedelim`. The following examples are real definitions taken from `biblatex.def`:

```
\DeclareMultiCiteCommand{\cites}%
```

¹ Typical examples of wrapper commands are `\mkbibparens` and `\mkbibfootnote`.

² The bibliographic data available to the `<loopcode>` is the data of the entry currently being processed. In addition to that, the data of the first entry is available to the `<precode>` and the data of the last one is available to the `<postcode>`. ‘First’ and ‘last’ refer to the order in which the citations are printed. If the `sortcites` package option is active, this is the order of the list after sorting. Note that no bibliographic data is available to the `<sepcode>`.

³ Note that the regular variant of `\DeclareCiteCommand` defines a starred version of the `<command>` implicitly, unless the starred version has been defined before. This is intended as a fallback. The implicit definition is an alias of the regular variant.

```

{\cite}{\multicitedelim}
\DeclareMultiCiteCommand{\parencites}[\mkbibparens]%
{\parencite}{\multicitedelim}
\DeclareMultiCiteCommand{\footcites}[\mkbibfootnote]%
{\footcite}{\multicitedelim}

```

```
\DeclareAutoCiteCommand{<name>}[<position>]{<cite>}{<multicite>}
```

This command provides definitions for the `\autocite` and `\autocites` commands from section 3.6.4. The definitions are enabled with the `autocite` package option from section 3.1.2. The `<name>` is an identifier which serves as the value passed to the package option. The `autocite` commands are built on top of backend commands like `\parencite` and `\parencites`. The arguments `<cite>` and `<multicite>` specify the backend commands to use. The `<cite>` argument refers to `\autocite` and `<multicite>` refers to `\autocites`. The `<position>` argument controls the handling of any punctuation marks after the citation. Possible values are ‘l’ and ‘r’. ‘r’ means that the punctuation is placed to the right of the citation, i. e., it will not be moved around. ‘l’ means that any punctuation after the citation is moved to the left of the citation. This is useful with citations in footnotes since it will place the footnote mark after the terminal punctuation. This argument is optional and defaults to r. See also `\DeclareAutoPunctuation` in section 4.6.5 and the `autopunct` package option in section 3.1.2. The following examples are real definitions taken from `biblatex.def`:

```

\DeclareAutoCiteCommand{plain}{\cite}{\cites}
\DeclareAutoCiteCommand{inline}{\parencite}{\parencites}
\DeclareAutoCiteCommand{footnote}[l]{\footcite}{\footcites}

```

4.3.2 Special fields

The following fields are used by `biblatex` to pass data to citation commands. They are not used in `bib` files but defined automatically by the package. From the perspective of a citation style, they are not different from the fields in a `bib` file. See also section 4.2.4.

prenote field (literal)

The `<prenote>` argument passed to a citation command. This field is specific to citations and not available in the bibliography. If the `<prenote>` argument is missing or empty, this field is undefined.

postnote field (literal)

The `<postnote>` argument passed to a citation command. This field is specific to citations and not available in the bibliography. If the `<postnote>` argument is missing or empty, this field is undefined.

4.4 Data interface

The data interface are the facilities used to format and print all bibliographic data. These facilities are available in both bibliography and citation styles.

4.4.1 Data commands

This section introduces the main data interface of the `biblatex` package. These are the commands doing most of the work, i. e., they actually print the data provided in lists and fields.

`\printfield`[*format*]{*field*}

This command prints a *field* using the formatting directive *format*, as defined with `\DeclareFieldFormat`. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *field* is undefined, nothing is printed. If the *format* is omitted, `\printfield` tries using the name of the field as a format name. For example, if the `title` field is to be printed and the *format* is not specified, it will try to use the field format `title`.¹ In this case, any type-specific formatting directive will also take precedence over the generic one. If all of these formats are undefined, it falls back to `default` as a last resort. Note that `\printfield` provides the name of the field currently being processed in `\currentfield` for use in field formatting directives.

`\printlist`[*format*][*start*–*stop*]{*literal list*}

This command loops over all items in a *literal list*, starting at item number *start* and stopping at item number *stop*, including *start* and *stop* (all lists are numbered starting at 1). Each item is printed using the formatting directive *format*, as defined with `\DeclareListFormat`. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *literal list* is undefined, nothing is printed. If the *format* is omitted, `\printlist` tries using the name of the list as a format name. In this case, any type-specific formatting directive will also take precedence over the generic one. If all of these formats are undefined, it falls back to `default` as a last resort. The *start* argument defaults to 1; *stop* defaults to the total number of items in the list. If the total number is greater than *maxitems*, *stop* defaults to *minitems* (see section 3.1.2). See `\printnames` for further details. Note that `\printlist` provides the name of the literal list currently being processed in `\currentlist` for use in list formatting directives.

`\printnames`[*format*][*start*–*stop*]{*name list*}

This command loops over all items in a *name list*, starting at item number *start* and stopping at item number *stop*, including *start* and *stop* (all lists are numbered starting at 1). Each item is printed using the formatting directive *format*, as defined with `\DeclareNameFormat`. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *name list* is undefined, nothing is printed. If the *format* is omitted, `\printnames` tries using the name of the list as a format name. In this case, any type-specific formatting directive will also take precedence over the generic one. If all of these formats are undefined, it falls back to `default` as a last resort. The

¹ In other words, `\printfield{title}` is equivalent to `\printfield[title]{title}`.

$\langle start \rangle$ argument defaults to 1; $\langle stop \rangle$ defaults to the total number of items in the list. If the total number is greater than $\langle maxnames \rangle$, $\langle stop \rangle$ defaults to $\langle minnames \rangle$ (see section 3.1.2). If you want to select a range but use the default list format, the first optional argument must still be given, but is left empty:

```
\printnames[][1-3]{...}
```

One of $\langle start \rangle$ and $\langle stop \rangle$ may be omitted, hence the following arguments are all valid:

```
\printnames[...][-1]{...}
\printnames[...][2-]{...}
\printnames[...][1-3]{...}
```

If you want to override $\langle maxnames \rangle$ and $\langle minnames \rangle$ and force printing of the entire list, you may refer to the `listtotal` counter in the second optional argument:

```
\printnames[...][-\value{listtotal}]{...}
```

Whenever `\printnames` and `\printlist` process a list, information concerning the current state is accessible by way of four counters: the `listtotal` counter holds the total number of items in the current list, `listcount` holds the number of the item currently being processed, `liststart` is the $\langle start \rangle$ argument passed to `\printnames` or `\printlist`, `liststop` is the $\langle stop \rangle$ argument. These counters are intended for use in list formatting directives. `listtotal` may also be used in the second optional argument to `\printnames` and `\printlist`. Note that these counters are local to list formatting directives and do not hold meaningful values when used anywhere else. For every list, there is also a counter by the same name which holds the total number of items in the corresponding list. For example, the `author` counter holds the total number of items in the `author` list. These counters are similar to `listtotal` except that they may also be used independently of list formatting directives. There are also `maxnames` and `minnames` as well as `maxitems` and `minitems` counters which hold the values of the corresponding package options. See section 4.9.5 for a complete list of such internal counters. Note that `\printnames` provides the name of the name list currently being processed in `\currentname` for use in name formatting directives.

`\printtext`[$\langle format \rangle$]{ $\langle text \rangle$ }

This command prints $\langle text \rangle$, which may be printable text or arbitrary code generating printable text. It clears the punctuation buffer before inserting $\langle text \rangle$ and informs `biblatex` that printable text has been inserted. This ensures that all preceding and following `\newblock` and `\newunit` commands have the desired effect. `\printfield` and `\printnames` as well as `\bibstring` and its companion commands (see section 4.7) do that automatically. Using this command is required if a bibliography style inserts literal text (including the commands from sections 4.6.3 and 4.6.4) to ensure that block and unit punctuation works as advertised in section 4.6.1. The optional $\langle format \rangle$ argument specifies a field formatting directive to be used to format $\langle text \rangle$. This may also be useful when several fields are to be printed as one chunk, for example, by enclosing the entire chunk in parentheses or

quotation marks. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *format* is omitted, the *text* is printed as is. See also section 4.10.4 for some practical hints.

`\printfile`[*format*]{*file*}

This command is similar to `\printtext` except that the second argument is a file name rather than literal text. The *file* argument must be the name of a valid LaTeX file found in TeX's search path. `\printfile` will use `\input` to load this *file*. If there is no such file, `\printfile` does nothing. The optional *format* argument specifies a field formatting directive to be applied to the *file*. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *format* is omitted, the *file* is printed as is. Note that this feature needs to be enabled explicitly by setting the package option `loadfiles` from section 3.1.2. By default, `\printfile` will not input any files.

`\indexfield`[*format*]{*field*}

This command is similar to `\printfield` except that the *field* is not printed but added to the index using the formatting directive *format*, as defined with `\DeclareIndexFieldFormat`. If a type-specific *format* has been declared, it takes precedence over the generic one. If the *field* is undefined, this command does nothing. If the *format* is omitted, `\indexfield` tries using the name of the field as a format name. In this case, any type-specific formatting directive will also take precedence over the generic one. If all of these formats are undefined, it falls back to default as a last resort.

`\indexlist`[*format*][*start*–*stop*]{*literal list*}

This command is similar to `\printlist` except that the items in the list are not printed but added to the index using the formatting directive *format*, as defined with `\DeclareIndexListFormat`. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *literal list* is undefined, this command does nothing. If the *format* is omitted, `\indexlist` tries using the name of the list as a format name. In this case, any type-specific formatting directive will also take precedence over the generic one. If all of these formats are undefined, it falls back to default as a last resort.

`\indexnames`[*format*][*start*–*stop*]{*name list*}

This command is similar to `\printnames` except that the items in the list are not printed but added to the index using the formatting directive *format*, as defined with `\DeclareIndexNameFormat`. If a type-specific *format* has been declared, the type-specific formatting directive takes precedence over the generic one. If the *name list* is undefined, this command does nothing. If the *format* is omitted, `\indexnames` tries using the name of the list as a format name. In this case, any type-specific formatting directive will also take precedence over the generic one. If all of these formats are undefined, it falls back to default as a last resort.

`\entrydata{⟨key⟩}{⟨code⟩}`

Data commands like `\printfield` normally use the data of the entry currently being processed. You may use `\entrydata` to switch contexts locally. The `⟨key⟩` is the entry key of the entry to use locally. The `⟨code⟩` is arbitrary code to be executed in this context. This code will be executed in a group. See section 4.10.1 for an example. Note that this command will automatically switch languages if the `babel` package option is enabled.

`\entryset{⟨precode⟩}{⟨postcode⟩}`

This command is intended for use in bibliography drivers handling `@set` entries. It will loop over all members of the set, as indicated by the `entryset` field, and execute the appropriate driver for the respective set member. This is similar to executing the `\usedriver` command from section 4.5.4 for each set member. The `⟨precode⟩` is arbitrary code to be executed prior to processing each item in the set. The `⟨postcode⟩` is arbitrary code to be executed immediately after processing each item. Both arguments are mandatory in terms of the syntax but may be left empty. See section 4.10.2 for usage examples.

4.4.2 Formatting directives

This section introduces the commands used to define the formatting directives required by the data commands from section 4.4.1. Note that all standard formats are defined in `biblatex.def` to make it easier to look up the defaults.

`\DeclareFieldFormat[⟨entry type⟩]{⟨format⟩}{⟨code⟩}`

Defines the field format `⟨format⟩`. This formatting directive is arbitrary `⟨code⟩` to be executed by `\printfield`. The value of the field will be passed to `⟨code⟩` as its first and only argument. If an `⟨entry type⟩` is specified, the format is specific to that type. The name of the field currently being processed is available in `\currentfield` in field formatting directives.

`\DeclareListFormat[⟨entry type⟩]{⟨format⟩}{⟨code⟩}`

Defines the literal list format `⟨format⟩`. This formatting directive is arbitrary `⟨code⟩` to be executed for every item in a list processed by `\printlist`. The current item will be passed to `⟨code⟩` as its first and only argument. If an `⟨entry type⟩` is specified, the format is specific to that type. Note that the formatting directive also handles the punctuation to be inserted between the individual items in the list. You need to check whether you are in the middle of or at the end of the list, i. e., whether `listcount` is smaller than or equal to `liststop`. The name of the literal list currently being processed is available in `\currentlist` in list formatting directives.

`\DeclareNameFormat[⟨entry type⟩]{⟨format⟩}{⟨code⟩}`

Defines the name list format `⟨format⟩`. This formatting directive is arbitrary `⟨code⟩` to be executed for every name in a list processed by `\printnames`. If an `⟨entry type⟩` is specified, the format is specific to that type. The individual parts of a name will be passed to `⟨code⟩` as separate arguments. These arguments are as follows:

- #1 The last names. If a name consists of a single part only (for example, ‘Aristotle’), this part will be treated as the last name.
- #2 The last names, given as initials.
- #3 The first names. This argument also includes all middle names.
- #4 The first names, given as initials.
- #5 The name prefixes, for example von, van, of, da, de, del, della, etc. Note that name prefixes are referred to as the ‘von part’ of the name in the BibTeX documentation.
- #6 The name prefixes, given as initials.
- #7 The name affixes, for example ‘junior’, ‘senior’, ‘der Jüngere’, ‘der Ältere’, etc. Note that name affixes are referred to as the ‘junior part’ of the name in the BibTeX documentation.
- #8 The name affixes, given as initials.

If a certain part of a name is not available, the corresponding argument will be empty, hence you may use `\ifblank` tests to check for the individual parts of a name. All initials are sensitive to the `terseinits` package option, see section 3.1.2 for details. Note that the formatting directive also handles the punctuation to be inserted between separate names and between the individual parts of a name. You need to check whether you are in the middle of or at the end of the list, i. e., whether `listcount` is smaller than or equal to `liststop`. The name of the name list currently being processed is available in `\currentname` in name formatting directives.

`\DeclareIndexFieldFormat` [*entry type*] {*format*} {*code*}

Defines the field format *format*. This formatting directive is arbitrary *code* to be executed by `\indexfield`. The value of the field will be passed to *code* as its first and only argument. If an *entry type* is specified, the format is specific to that type. This command is similar to `\DeclareFieldFormat` except that the data handled by *code* is not intended to be printed but written to the index. Note that `\indexfield` will execute *code* as is, i. e., *code* must include `\index` or a similar command. The name of the field currently being processed is available in `\currentfield` in field indexing directives.

`\DeclareIndexListFormat` [*entry type*] {*format*} {*code*}

Defines the literal list format *format*. This formatting directive is arbitrary *code* to be executed for every item in a list processed by `\indexlist`. The current item will be passed to *code* as its only argument. If an *entry type* is specified, the format is specific to that type. This command is similar to `\DeclareListFormat` except that the data handled by *code* is not intended to be printed but written to the index. Note that `\indexlist` will execute *code* as is, i. e., *code* must include `\index` or a similar command. The name of the literal list currently being processed is available in `\currentlist` in list indexing directives.

`\DeclareIndexNameFormat` [*entry type*] {*format*} {*code*}

Defines the name list format *format*. This formatting directive is arbitrary *code*

to be executed for every name in a list processed by `\indexnames`. If an *⟨entry type⟩* is specified, the format is specific to that type. The parts of the name will be passed to *⟨code⟩* as separate arguments. This command is similar to `\DeclareNameFormat` except that the data handled by *⟨code⟩* is not intended to be printed but written to the index. Note that `\indexnames` will execute *⟨code⟩* as is, i. e., *⟨code⟩* must include `\index` or a similar command. The name of the name list currently being processed is available in `\currentname` in name indexing directives.

`\DeclareFieldAlias`[*⟨entry type⟩*]{*⟨alias⟩*}[*⟨format entry type⟩*]{*⟨format⟩*}

Declares *⟨alias⟩* to be an alias of the field format *⟨format⟩*. If an *⟨entry type⟩* is specified, the alias is specific to that type. The *⟨format entry type⟩* is the entry type of the backend format. This is only required when declaring an alias of a type-specific formatting directive.

`\DeclareListAlias`[*⟨entry type⟩*]{*⟨alias⟩*}[*⟨format entry type⟩*]{*⟨format⟩*}

Declares *⟨alias⟩* to be an alias of the literal list format *⟨format⟩*. If an *⟨entry type⟩* is specified, the alias is specific to that type. The *⟨format entry type⟩* is the entry type of the backend format. This is only required when declaring an alias of a type-specific formatting directive.

`\DeclareNameAlias`[*⟨entry type⟩*]{*⟨alias⟩*}[*⟨format entry type⟩*]{*⟨format⟩*}

Declares *⟨alias⟩* to be an alias of the name list format *⟨format⟩*. If an *⟨entry type⟩* is specified, the alias is specific to that type. The *⟨format entry type⟩* is the entry type of the backend format. This is only required when declaring an alias of a type-specific formatting directive.

`\DeclareIndexFieldAlias`[*⟨entry type⟩*]{*⟨alias⟩*}[*⟨format entry type⟩*]{*⟨format⟩*}

Declares *⟨alias⟩* to be an alias of the field format *⟨format⟩*. If an *⟨entry type⟩* is specified, the alias is specific to that type. The *⟨format entry type⟩* is the entry type of the backend format. This is only required when declaring an alias of a type-specific formatting directive.

`\DeclareIndexListAlias`[*⟨entry type⟩*]{*⟨alias⟩*}[*⟨format entry type⟩*]{*⟨format⟩*}

Declares *⟨alias⟩* to be an alias of the literal list format *⟨format⟩*. If an *⟨entry type⟩* is specified, the alias is specific to that type. The *⟨format entry type⟩* is the entry type of the backend format. This is only required when declaring an alias of a type-specific formatting directive.

`\DeclareIndexNameAlias`[*⟨entry type⟩*]{*⟨alias⟩*}[*⟨format entry type⟩*]{*⟨format⟩*}

Declares *⟨alias⟩* to be an alias of the name list format *⟨format⟩*. If an *⟨entry type⟩* is specified, the alias is specific to that type. The *⟨format entry type⟩* is the entry type of the backend format. This is only required when declaring an alias of a type-specific formatting directive.

4.5 Auxiliary commands

The facilities in this section are intended for analyzing and saving bibliographic data rather than formatting and printing it.

4.5.1 Data commands

The commands in this section grant low-level access to the unformatted bibliographic data. They are not intended for typesetting but rather for things like saving data to a temporary macro so that it may be used in a comparison later.

`\thefield{⟨field⟩}`

Expands to the unformatted *⟨field⟩*. If the *⟨field⟩* is undefined, this command expands to an empty string.

`\strfield{⟨field⟩}`

Similar to `\thefield`, except that the field is automatically sanitized such that its value may safely be used in the formation of a control sequence name.

`\thelist{⟨literal list⟩}`

Expands to the unformatted *⟨literal list⟩*. If the list is undefined, this command expands to an empty string. Note that this command will dump the *⟨literal list⟩* in the internal format used by this package. This format is not suitable for printing.

`\thename{⟨name list⟩}`

Expands to the unformatted *⟨name list⟩*. If the list is undefined, this command expands to an empty string. Note that this command will dump the *⟨name list⟩* in the internal format used by this package. This format is not suitable for printing.

`\savefield{⟨field⟩}{⟨macro⟩}`

`\savefield*{⟨field⟩}{⟨macro⟩}`

Copies an unformatted *⟨field⟩* to a *⟨macro⟩*. The regular variant of this command defines the *⟨macro⟩* globally, the starred one works locally.

`\savelist{⟨literal list⟩}{⟨macro⟩}`

`\savelist*{⟨literal list⟩}{⟨macro⟩}`

Copies an unformatted *⟨literal list⟩* to a *⟨macro⟩*. The regular variant of this command defines the *⟨macro⟩* globally, the starred one works locally.

`\savename{⟨name list⟩}{⟨macro⟩}`

`\savename*{⟨name list⟩}{⟨macro⟩}`

Copies an unformatted *⟨name list⟩* to a *⟨macro⟩*. The regular variant of this command defines the *⟨macro⟩* globally, the starred one works locally.

`\savefieldcs{⟨field⟩}{⟨csname⟩}`
`\savefieldcs*{⟨field⟩}{⟨csname⟩}`

Similar to `\savefield`, but takes the control sequence name `⟨csname⟩` (without a leading backslash) as an argument, rather than a macro name.

`\savelistcs{⟨literal list⟩}{⟨csname⟩}`
`\savelistcs*{⟨literal list⟩}{⟨csname⟩}`

Similar to `\savelist`, but takes the control sequence name `⟨csname⟩` (without a leading backslash) as an argument, rather than a macro name.

`\savenamecs{⟨name list⟩}{⟨csname⟩}`
`\savenamecs*{⟨name list⟩}{⟨csname⟩}`

Similar to `\savename`, but takes the control sequence name `⟨csname⟩` (without a leading backslash) as an argument, rather than a macro name.

`\restorefield{⟨field⟩}{⟨macro⟩}`

Restores a `⟨field⟩` from a `⟨macro⟩` defined with `\savefield` before. The field is restored within a local scope.

`\restorelist{⟨literal list⟩}{⟨macro⟩}`

Restores a `⟨literal list⟩` from a `⟨macro⟩` defined with `\savelist` before. The list is restored within a local scope.

`\restorename{⟨name list⟩}{⟨macro⟩}`

Restores a `⟨name list⟩` from a `⟨macro⟩` defined with `\savename` before. The list is restored within a local scope.

`\clearfield{⟨field⟩}`

Clears the `⟨field⟩` within a local scope. A field cleared this way is treated as undefined by subsequent data commands.

`\clearlist{⟨literal list⟩}`

Clears the `⟨literal list⟩` within a local scope. A list cleared this way is treated as undefined by subsequent data commands.

`\clearname{⟨name list⟩}`

Clears the `⟨name list⟩` within a local scope. A list cleared this way is treated as undefined by subsequent data commands.

4.5.2 Stand-alone tests

The commands in this section are various kinds of stand-alone tests for use in bibliography and citation styles.

`\iffieldundef{⟨field⟩}{⟨true⟩}{⟨false⟩}`

Expands to `⟨true⟩` if the `⟨field⟩` is undefined, and to `⟨false⟩` otherwise.

`\iflistundef`{*literal list*}{*true*}{*false*}

Expands to *true* if the *literal list* is undefined, and to *false* otherwise.

`\ifnameundef`{*name list*}{*true*}{*false*}

Expands to *true* if the *name list* is undefined, and to *false* otherwise.

`\iffieldsequal`{*field 1*}{*field 2*}{*true*}{*false*}

Expands to *true* if the values of *field 1* and *field 2* are equal, and to *false* otherwise.

`\iflistsequal`{*literal list 1*}{*literal list 2*}{*true*}{*false*}

Expands to *true* if the values of *literal list 1* and *literal list 2* are equal, and to *false* otherwise.

`\ifnameequal`{*name list 1*}{*name list 2*}{*true*}{*false*}

Expands to *true* if the values of *name list 1* and *name list 2* are equal, and to *false* otherwise.

`\iffieldequal`s{*field*}{*macro*}{*true*}{*false*}

Expands to *true* if the value of the *field* is equal to the definition of *macro*, and to *false* otherwise.

`\iflistequal`s{*literal list*}{*macro*}{*true*}{*false*}

Expands to *true* if the value of the *literal list* is equal to the definition of *macro*, and to *false* otherwise.

`\ifnameequal`s{*name list*}{*macro*}{*true*}{*false*}

Expands to *true* if the value of the *name list* is equal to the definition of *macro*, and to *false* otherwise.

`\iffieldequal`cs{*field*}{*csname*}{*true*}{*false*}

Similar to `\iffieldequals` but takes the control sequence name *csname* (without a leading backslash) as an argument, rather than a macro name.

`\iflistequal`cs{*literal list*}{*csname*}{*true*}{*false*}

Similar to `\iflistequals` but takes the control sequence name *csname* (without a leading backslash) as an argument, rather than a macro name.

`\ifnameequal`cs{*name list*}{*csname*}{*true*}{*false*}

Similar to `\ifnameequals` but takes the control sequence name *csname* (without a leading backslash) as an argument, rather than a macro name.

`\iffieldequal`str{*field*}{*string*}{*true*}{*false*}

Executes *true* if the value of the *field* is equal to *string*, and *false* otherwise. This command is robust.

`\iffielddxref{<field>}{<true>}{<false>}`

If the `crossref/xref` field of an entry is defined, this command checks if the `<field>` is related to the cross-referenced parent entry. It executes `<true>` if the `<field>` of the child entry is equal to the corresponding `<field>` of the parent entry, and `<false>` otherwise. If the `crossref/xref` field is undefined, it always executes `<false>`. This command is robust. See the description of the `crossref` and `xref` fields in section 2.2.3 as well as section 2.4.1 for further information concerning cross-referencing.

`\iflistxref{<literal list>}{<true>}{<false>}`

Similar to `\iffielddxref` but checks if a `<literal list>` is related to the cross-referenced parent entry. See the description of the `crossref` and `xref` fields in section 2.2.3 as well as section 2.4.1 for further information concerning cross-referencing.

`\ifnamexref{<name list>}{<true>}{<false>}`

Similar to `\iffielddxref` but checks if a `<name list>` is related to the cross-referenced parent entry. See the description of the `crossref` and `xref` fields in section 2.2.3 as well as section 2.4.1 for further information concerning cross-referencing.

`\ifcurrentfield{<field>}{<true>}{<false>}`

Executes `<true>` if the current field is `<field>`, and `<false>` otherwise. This command is robust. It is intended for use in field formatting directives and always executes `<false>` when used in any other context.

`\ifcurrentlist{<literal list>}{<true>}{<false>}`

Executes `<true>` if the current list is `<literal list>`, and `<false>` otherwise. This command is robust. It is intended for use in list formatting directives and always executes `<false>` when used in any other context.

`\ifcurrentname{<name list>}{<true>}{<false>}`

Executes `<true>` if the current list is `<name list>`, and `<false>` otherwise. This command is robust. It is intended for use in list formatting directives and always executes `<false>` when used in any other context.

`\ifuseprefix{<true>}{<false>}`

Expands to `<true>` if the `useprefix` option is enabled (either globally or for the current entry), and `<false>` otherwise. See section 3.1.4 for details on this option.

`\ifuseauthor{<true>}{<false>}`

Expands to `<true>` if the `useauthor` option is enabled (either globally or for the current entry), and `<false>` otherwise. See section 3.1.4 for details on this option.

`\ifuseeditor{<true>}{<false>}`

Expands to `<true>` if the `useeditor` option is enabled (either globally or for the current entry), and `<false>` otherwise. See section 3.1.4 for details on this option.

`\ifusetranslator{⟨true⟩}{⟨false⟩}`

Expands to *⟨true⟩* if the `usetranslator` option is enabled (either globally or for the current entry), and *⟨false⟩* otherwise. See section 3.1.4 for details on this option.

`\ifsingletitle{⟨true⟩}{⟨false⟩}`

Expands to *⟨true⟩* if there is only one work by the author or editor in the bibliography, and to *⟨false⟩* otherwise. Note that this feature needs to be enabled explicitly with the package option `singletitle`.

`\ifandothers{⟨list⟩}{⟨true⟩}{⟨false⟩}`

Expands to *⟨true⟩* if the *⟨list⟩* is defined and has been truncated in the `bib` file with the keyword ‘and others’, and to *⟨false⟩* otherwise. The *⟨list⟩* may be a literal list or a name list.

`\ifmorenames{⟨true⟩}{⟨false⟩}`

Expands to *⟨true⟩* if the current name list has been or will be truncated, and to *⟨false⟩* otherwise. This command is intended for use in formatting directives for name lists. It will always expand to *⟨false⟩* when used elsewhere. This command performs the equivalent of an `\ifandothers` test for the current list. If this test is negative, it also checks if the `listtotal` counter is larger than `liststop`. This command may be used in a formatting directive to decide if a note such as “and others” or “et al.” is to be printed at the end of the list. Note that you still need to check whether you are in the middle or at the end of the list, i. e., whether `listcount` is smaller than or equal to `liststop`, see section 4.4.1 for details.

`\ifmoreitems{⟨true⟩}{⟨false⟩}`

This command is similar to `\ifmorenames` but checks the current literal list. It is intended for use in formatting directives for literal lists. It will always expand to *⟨false⟩* when used elsewhere.

`\iffirstinits{⟨true⟩}{⟨false⟩}`

Expands to *⟨true⟩* or *⟨false⟩*, depending on the state of the `firstinits` package option (see section 3.1.5). This command is intended for use in formatting directives for name lists.

`\ifciteseen{⟨true⟩}{⟨false⟩}`

Executes *⟨true⟩* if the entry currently being processed has been cited before, and *⟨false⟩* otherwise. This command is robust and intended for use in citation styles. If there are any `refsection` environments in the document, the citation tracking is local to these environments. Note that the citation tracker needs to be enabled explicitly with the package option `citetracker`. The behavior of this test depends on the mode the citation tracker is operating in, see section 3.1.5 for details. If the citation tracker is disabled, the test always yields *⟨false⟩*. Also see the `\citetrackertrue` and `\citetrackerfalse` switches in section 4.5.4.

`\ifentryseen{⟨entrykey⟩}{⟨true⟩}{⟨false⟩}`

A variant of `\ifciteseen` which takes an entry key as its first argument. Since the `⟨entrykey⟩` is expanded prior to performing the test, it is possible to test for entry keys in a field such as `xref`:

```
\ifentryseen{\thefield{xref}}{true}{false}
```

Apart from the additional argument, `\ifentryseen` behaves like `\ifciteseen`.

`\ifciteibid{⟨true⟩}{⟨false⟩}`

Expands to `⟨true⟩` if the entry currently being processed is the same as the last one, and to `⟨false⟩` otherwise. This command is intended for use in citation styles. If there are any `refsection` environments in the document, the tracking is local to these environments. Note that the ‘ibidem’ tracker needs to be enabled explicitly with the package option `ibidtracker`. The behavior of this test depends on the mode the tracker is operating in, see section 3.1.5 for details. If the tracker is disabled, the test always yields `⟨false⟩`. Also see the `\citetrackertrue` and `\citetrackerfalse` switches in section 4.5.4.

`\ifciteidem{⟨true⟩}{⟨false⟩}`

Expands to `⟨true⟩` if the primary name (i.e., the author or editor) in the entry currently being processed is the same as the last one, and to `⟨false⟩` otherwise. This command is intended for use in citation styles. If there are any `refsection` environments in the document, the tracking is local to these environments. Note that the ‘idem’ tracker needs to be enabled explicitly with the package option `idemtracker`. The behavior of this test depends on the mode the tracker is operating in, see section 3.1.5 for details. If the tracker is disabled, the test always yields `⟨false⟩`. Also see the `\citetrackertrue` and `\citetrackerfalse` switches in section 4.5.4.

`\ifopcit{⟨true⟩}{⟨false⟩}`

This command is similar to `\ifciteibid` except that it expands to `⟨true⟩` if the entry currently being processed is the same as the last one *by this author or editor*. Note that the ‘opcit’ tracker needs to be enabled explicitly with the package option `opcittracker`. The behavior of this test depends on the mode the tracker is operating in, see section 3.1.5 for details. If the tracker is disabled, the test always yields `⟨false⟩`. Also see the `\citetrackertrue` and `\citetrackerfalse` switches in section 4.5.4.

`\ifloccit{⟨true⟩}{⟨false⟩}`

This command is similar to `\ifopcit` except that it also compares the `⟨postnote⟩` arguments and expands to `⟨true⟩` only if they match and are numerical (in the sense of `\ifnumerals` from section 4.5.2), i.e., `\ifloccit` will yield `true` if the citation refers to the same page cited before. Note that the ‘loccit’ tracker needs to be enabled explicitly with the package option `loccittracker`. The behavior of this test depends on the mode the tracker is operating in, see section 3.1.5 for details. If the

tracker is disabled, the test always yields $\langle false \rangle$. Also see the `\citetrackertrue` and `\citetrackerfalse` switches in section 4.5.4.

`\iffirstonpage`{ $\langle true \rangle$ }{ $\langle false \rangle$ }

The behavior of this command is responsive to the package option `pagetracker`. If the option is set to `page`, it expands to $\langle true \rangle$ if the current item is the first one on the page, and to $\langle false \rangle$ otherwise. If the option is set to `spread`, it expands to $\langle true \rangle$ if the current item is the first one on the double-page spread, and to $\langle false \rangle$ otherwise. If the page tracker is disabled, this test always yields $\langle false \rangle$. Depending on the context, the ‘item’ may be a citation or an entry in the bibliography or the list of shorthands. Note that this test distinguishes between body text and footnotes. For example, if used in the first footnote on a page, it will expand to $\langle true \rangle$ even if there is a citation in the body text prior to the footnote. Also see the `\pagetrackertrue` and `\pagetrackerfalse` switches in section 4.5.4.

`\ifsamepage`{ $\langle instance 1 \rangle$ }{ $\langle instance 2 \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }

This command expands to $\langle true \rangle$ if two instances of a reference are located on the same page or double-page spread, and to $\langle false \rangle$ otherwise. An instance of a reference may be a citation or an entry in the bibliography or the list of shorthands. These instances are identified by the value of the `instcount` counter, see section 4.9.5. The behavior of this command is responsive to the package option `pagetracker`. If this option is set to `spread`, `\ifsamepage` is in fact an ‘if same spread’ test. If the page tracker is disabled, this test always yields $\langle false \rangle$. The arguments $\langle instance 1 \rangle$ and $\langle instance 2 \rangle$ are treated as integer expressions in the sense of e-TeX’s `\numexpr`. This implies that it is possible to make calculations within these arguments, for example:

```
\ifsamepage{\value{instcount}}{\value{instcount}-1}{true}{false}
```

Note that `\value` is not prefixed by `\the` and that the subtraction is included in the second argument in the above example. If $\langle instance 1 \rangle$ or $\langle instance 2 \rangle$ is an invalid number (for example, a negative one), the test yields $\langle false \rangle$. Also note that this test does not distinguish between body text and footnotes. Also see the `\pagetrackertrue` and `\pagetrackerfalse` switches in section 4.5.4.

`\ifinteger`{ $\langle string \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }

Executes $\langle true \rangle$ if the $\langle string \rangle$ is a positive integer, and $\langle false \rangle$ otherwise. This command is robust.

`\ifnumeral`{ $\langle string \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }

Executes $\langle true \rangle$ if the $\langle string \rangle$ is an Arabic or Roman numeral, and $\langle false \rangle$ otherwise. This command is robust. See also `\DeclareNumChars` and `\NumCheckSetup` in section 4.5.4.

`\ifnumerals`{ $\langle string \rangle$ }{ $\langle true \rangle$ }{ $\langle false \rangle$ }

Executes $\langle true \rangle$ if the $\langle string \rangle$ is a range or a list of Arabic or Roman numerals, and $\langle false \rangle$ otherwise. This command is robust. In contrast to `\ifnumeral`,

it will also execute $\langle true \rangle$ with arguments like “52–58”, “14/15”, “1, 3, 5”, and so on. See also `\DeclareNumChars`, `\DeclareRangeChars`, `\DeclareRangeCommands`, and `\NumCheckSetup` in section 4.5.4.

`\ifbibstring` $\{\langle string \rangle\}\{\langle true \rangle\}\{\langle false \rangle\}$

Expands to $\langle true \rangle$ if the $\langle string \rangle$ is a known localization key, and to $\langle false \rangle$ otherwise. The localization keys defined by default are listed in section 4.8.2. New ones may be defined with `\NewBibliographyString`.

`\iffieldbibstring` $\{\langle field \rangle\}\{\langle true \rangle\}\{\langle false \rangle\}$

Similar to `\ifbibstring`, but uses the value of a $\langle field \rangle$ rather than a literal $\langle string \rangle$ in the test. If the $\langle field \rangle$ is undefined, it expands to $\langle false \rangle$.

`\ifcapital` $\{\langle true \rangle\}\{\langle false \rangle\}$

Executes $\langle true \rangle$ if `biblatex`’s punctuation tracker would capitalize a bibliography string at the current location, and $\langle false \rangle$ otherwise. This command is robust. It may be useful for conditional capitalization of certain parts of a name in a formatting directive.

`\ifcitation` $\{\langle true \rangle\}\{\langle false \rangle\}$

Expands to $\langle true \rangle$ when located in a citation, and to $\langle false \rangle$ otherwise. Note that this command is responsive to the outermost context in which it is used. For example, if a citation command defined with `\DeclareCiteCommand` executes a driver defined with `\DeclareBibliographyDriver`, any `\ifcitation` tests in the driver code will yield $\langle true \rangle$. See section 4.10.1 for a practical example.

`\ifbibliography` $\{\langle true \rangle\}\{\langle false \rangle\}$

Expands to $\langle true \rangle$ when located in a bibliography, and to $\langle false \rangle$ otherwise. Note that this command is responsive to the outermost context in which it is used. For example, if a driver defined with `\DeclareBibliographyDriver` executes a citation command defined with `\DeclareCiteCommand`, any `\ifbibliography` tests in the citation code will yield $\langle true \rangle$. See section 4.10.1 for a practical example.

`\iffootnote` $\{\langle true \rangle\}\{\langle false \rangle\}$

Expands to $\langle true \rangle$ when located in a footnote, and to $\langle false \rangle$ otherwise. Note that footnotes in `minipage` environments are considered to be part of the body text. This command will only expand to $\langle true \rangle$ in footnotes at the bottom of the page and in endnotes as provided by the `endnotes` package.

`uniquename` In contrast to most facilities in this section, `uniquename` is a counter and not a test. The counter refers to the `labelname` list. Its value is 0 if the author’s or editor’s last name is unique, 1 if adding the other parts of the name (first name, prefix, suffix) as initials will make it unique, and 2 if the full name is required to form a unique citation. This information is required by author-year and author-title citation schemes which add additional parts of the name when citing different authors with the same last name. For example, if there is one ‘John Doe’ and one ‘Edward

Doe’ in the list of references, this counter will be set to 1 for all works by these authors. If there is one ‘John Doe’ and one ‘Jane Doe’, the value of the counter will be 2. Note that this feature needs to be enabled explicitly with the package option `uniquename`. If the option is disabled, the value of the counter is always zero. If the option is set to `init`, the counter will be limited to 1. This is useful for citations styles which use initials to disambiguate names but never print the full name in citations. Also note that this feature only works with single names. If the `labelname` list holds multiple names, the value of the counter is always zero.

4.5.3 Tests with `\ifthenelse`

The tests introduced in section 4.5.2 may also be used in the first argument of the `\ifthenelse` command provided by the `ifthen` package. The syntax of the tests is slightly different in this case: the `<true>` and `<false>` arguments are omitted from the test itself and passed to the `\ifthenelse` command instead. Note that the use of this command implies a certain processing overhead. If you do not need any boolean operators, it is more efficient to use the stand-alone tests from section 4.5.2.

```
\ifthenelse{<tests>}{<true>}{<false>}
```

This command allows for complex tests with boolean operators and grouping:

```
\ifthenelse{\( \ifnameundef{editor} \and \not \iflistundef{location} \)
             \or
             \iffieldundef{year}}
  {...}
  {...}
```

Of course the generic tests provided by the `ifthen` package itself may be used alongside the additional ones provided by `biblatex`. In case it is not obvious: the generic test in the example below is `>`, the greater-than sign. `\value` is a standard LaTeX command which returns the value of a counter.

```
\ifthenelse{\value{editor}>1 \or \ifandothers{editor}}
  {...}
  {...}
```

The additional tests provided by `biblatex` are only available when `\ifthenelse` is used in citation commands and in the bibliography.

4.5.4 Miscellaneous commands

The section introduced miscellaneous commands and little helpers for use in bibliography and citation styles.

```
\newbibmacro{<name>}[<arguments>][<optional>]{<definition>}
\newbibmacro*{<name>}[<arguments>][<optional>]{<definition>}
```

Defines a macro to be executed via `\usebibmacro` later. The syntax of this command is similar to `\newcommand` except that `<name>` may contain characters such as numbers and punctuation marks and does not start with a backslash. The optional

argument $\langle arguments \rangle$ is an integer specifying the number of arguments taken by the macro. If $\langle optional \rangle$ is given, it specifies a default value for the first argument of the macro, which automatically becomes an optional argument. If the macro is already defined, this command issues an error message. As with `\newcommand`, the regular variant of this command uses the `\long` prefix in the definition while the starred one does not. If a macro has been declared to be long, it may take arguments containing `\par` tokens. `\newbibmacro` and `\renewbibmacro` are provided for convenience. Style authors are free to use `\newcommand` or `\def` instead. However, note that most shared definitions found in `biblatex.def` are defined with `\newbibmacro`, hence they must be used and modified accordingly.

```
\renewbibmacro{ $\langle name \rangle$ }[ $\langle arguments \rangle$ ][ $\langle optional \rangle$ ]{ $\langle definition \rangle$ }
\renewbibmacro*{ $\langle name \rangle$ }[ $\langle arguments \rangle$ ][ $\langle optional \rangle$ ]{ $\langle definition \rangle$ }
```

Similar to `\newbibmacro` but redefines $\langle name \rangle$. This command issues an error message if the macro is undefined.

```
\usebibmacro{ $\langle name \rangle$ }
```

Executes the macro $\langle name \rangle$, as defined with `\newbibmacro`. If the macro takes any arguments, they are simply appended after $\langle name \rangle$. `\usebibmacro` is robust.

```
\savecommand{ $\langle command \rangle$ }
\restorecommand{ $\langle command \rangle$ }
```

These commands save and restore any $\langle command \rangle$, which must be a command name starting with a backslash. Both commands work within a local scope. They are mainly provided for use in localization files.

```
\savebibmacro{ $\langle name \rangle$ }
\restorebibmacro{ $\langle name \rangle$ }
```

These commands save and restore the macro $\langle name \rangle$, where $\langle name \rangle$ is the identifier of a macro defined with `\newbibmacro`. Both commands work within a local scope. They are mainly provided for use in localization files.

```
\savefieldformat[ $\langle entry type \rangle$ ]{ $\langle format \rangle$ }
\restorefieldformat[ $\langle entry type \rangle$ ]{ $\langle format \rangle$ }
```

These commands save and restore the formatting directive $\langle format \rangle$, as defined with `\DeclareFieldFormat`. Both commands work within a local scope. They are mainly provided for use in localization files.

```
\savelistformat[ $\langle entry type \rangle$ ]{ $\langle format \rangle$ }
\restorelistformat[ $\langle entry type \rangle$ ]{ $\langle format \rangle$ }
```

These commands save and restore the formatting directive $\langle format \rangle$, as defined with `\DeclareListFormat`. Both commands work within a local scope. They are mainly provided for use in localization files.

`\savenameformat`[\langle entry type \rangle]{ \langle format \rangle }
`\restorenameformat`[\langle entry type \rangle]{ \langle format \rangle }

These commands save and restore the formatting directive \langle format \rangle , as defined with `\DeclareNameFormat`. Both commands work within a local scope. They are mainly provided for use in localization files.

`\usedriver`{ \langle code \rangle }{ \langle type \rangle }

Executes the bibliography driver for an entry \langle type \rangle . Calling this command in the \langle loopcode \rangle of a citation command defined with `\DeclareCiteCommand` is a simple way to print full citations similar to a bibliography entry. Commands such as `\newblock`, which are not applicable in a citation, are disabled automatically. Additional initialization commands may be passed as the \langle code \rangle argument. This argument is executed inside the group in which `\usedriver` runs the respective driver. Note that it is mandatory in terms of the syntax but may be left empty. Also note that this command will automatically switch languages if the `babel` package option is enabled.

`\bibhypertarget`{ \langle name \rangle }{ \langle text \rangle }

A wrapper for `hyperref`'s `\hypertarget` command. The \langle name \rangle is the name of the anchor, the \langle text \rangle is arbitrary printable text or code which serves as an anchor. If there are any `refsection` environments in the document, the \langle name \rangle is local to the current environment. If the `hyperref` package option is disabled or the `hyperref` package has not been loaded, this command will simply pass on its \langle text \rangle argument. See also the formatting directive `bibhypertarget` in section 4.9.4.

`\bibhyperlink`{ \langle name \rangle }{ \langle text \rangle }

A wrapper for `hyperref`'s `\hyperlink` command. The \langle name \rangle is the name of an anchor defined with `\bibhypertarget`, the \langle text \rangle is arbitrary printable text or code to be transformed into a link. If there are any `refsection` environments in the document, the \langle name \rangle is local to the current environment. If the `hyperref` package option is disabled or the `hyperref` package has not been loaded, this command will simply pass on its \langle text \rangle argument. See also the formatting directive `bibhyperlink` in section 4.9.4.

`\bibhyperref`[\langle entrykey \rangle]{ \langle text \rangle }

Transforms \langle text \rangle into an internal link pointing to \langle entrykey \rangle in the bibliography. If \langle entrykey \rangle is omitted, this command uses the key of the entry currently being processed. This command is employed to transform citations into clickable links pointing to the corresponding entry in the bibliography. The link target is marked automatically by `biblatex`. If there are multiple bibliographies in a document, the target will be the first occurrence of \langle entrykey \rangle in one of the bibliographies. If there are `refsection` environments, the links are local to the environment. See also the formatting directive `bibhyperref` in section 4.9.4.

`\ifhyperref{⟨true⟩}{⟨false⟩}`

Expands to `⟨true⟩` if the `hyperref` package option is enabled (which implies that the `hyperref` package has been loaded), and to `⟨false⟩` otherwise.

`\docsvfield{⟨field⟩}`

Similar to the `\docsvlist` command from the `etoolbox` package, except that it takes a field name as its argument. The value of this field is parsed as a comma-separated list. If the `⟨field⟩` is undefined, this command expands to an empty string.

`\MakeCapital{⟨text⟩}`

Similar to `\MakeUppercase` but only converts the first printable character in `⟨text⟩` to uppercase. Note that the restrictions that apply to `\MakeUppercase` also apply to this command. Namely, all commands in `⟨text⟩` must either be robust or prefixed with `\protect` since the `⟨text⟩` is expanded during capitalization. Apart from Ascii characters and the standard accent commands, this command also handles the active characters of the `inputenc` package as well as the shorthands of the `babel` package. If the `⟨text⟩` starts with a control sequence, nothing is capitalized. This command is robust.

`\MakeSentenceCase{⟨text⟩}`

`\MakeSentenceCase*{⟨text⟩}`

Converts its `⟨text⟩` argument to sentence case, i. e., the first word is capitalized and the remainder of the string is converted to lowercase. This command is robust. The starred variant differs from the regular version in that it considers the language of the entry, as specified in the `hyphenation` field. It only converts the `⟨text⟩` to sentence case if the `hyphenation` field is undefined or if it holds a language declared with `\DeclareCaseLangs` (see below).¹ Otherwise, the `⟨text⟩` is not altered in any way. It is recommended to use `\MakeSentenceCase*` rather than the regular variant in formatting directives. Both variants support the traditional BibTeX convention for `bib` files that anything wrapped in a pair of curly braces is not modified when changing the case. For example:

```
\MakeSentenceCase{an Introduction to LaTeX}
\MakeSentenceCase{an Introduction to {LaTeX}}
```

would yield:

```
An introduction to latex
An introduction to LaTeX
```

In `bib` files designed with traditional BibTeX in mind, it has been fairly common to only wrap single letters in braces to prevent case-changing:

```
title = {An Introduction to {L}a{T}e{X}}
```

¹ By default, converting to sentence case is enabled for the following language identifiers: `american`, `british`, `canadian`, `english`, `australian`, `newzealand` as well as the aliases `USenglish` and `UKenglish`. Use `\DeclareCaseLangs` to extend or change this list.

The problem with this convention is that the braces will suppress the kerning on both sides of the enclosed letter. It is preferable to wrap the entire word in braces as shown in the first example.

`\mkpageprefix[<pagination>]{<text>}`

This command is intended for use in field formatting directives which format the page numbers in the *<postnote>* argument of citation commands and the pages field of bibliography entries. It will parse its *<text>* argument and prefix it with ‘p.’ or ‘pp.’ by default. The optional *<pagination>* argument holds the name of a field indicating the pagination type. This may be either *pagination* or *bookpagination*, with *pagination* being the default. The spacing between the prefix and the *<text>* may be modified by redefining `\ppspace`. The default is an unbreakable interword space. See sections 2.3.9 and 3.II.3 for further details. See also `\DeclareNumChars`, `\DeclareRangeChars`, `\DeclareRangeCommands`, and `\NumCheckSetup`. Here are two examples from `biblatex.def`:

```
\DeclareFieldFormat{postnote}{\mkpageprefix[pagination]{#1}}
\DeclareFieldFormat{pages}{\mkpageprefix[bookpagination]{#1}}
```

The optional argument *pagination* in the first example is omissible.

`\mkpagetotal[<pagination>]{<text>}`

This command is similar to `\mkpageprefix` except that it is intended for the *pagetotal* field of bibliography entries, i.e., it will print “123 pages” rather than “page 123”. The optional *<pagination>* argument defaults to *bookpagination*. The spacing inserted between the pagination suffix and the *<text>* may be modified by redefining the macro `\ppspace`. Here is an example from `biblatex.def`:

```
\DeclareFieldFormat{pagetotal}{\mkpagetotal[bookpagination]{#1}}
```

The optional argument *bookpagination* is omissible in this case.

`\DeclareNumChars{<characters>}`
`\DeclareNumChars*{<characters>}`

Use this command to configure the `\ifnumeral` and `\ifnumerals` tests from section 4.5.2. These tests are also used by `\mkpageprefix` and `\mkpagetotal`. The *<characters>* argument is an undelimited list of characters which are to be considered as being part of a number. The regular version of this command replaces the current setting, the starred version appends its argument to the current list. The default setting is:

```
\DeclareNumChars{.}
```

This means that a (section or other) number like ‘3.4.5’ will be considered as a single number by `\ifnumeral` and `\ifnumerals`. Note that Arabic and Roman numerals are detected by default, there is no need to declare them explicitly.

`\DeclareRangeChars{⟨characters⟩}`
`\DeclareRangeChars*{⟨characters⟩}`

Use this command to configure the `\ifnumerals` test from section 4.5.2. This test is also used by `\mkpageprefix` and `\mkpagetotal`. The `⟨characters⟩` argument is an undelimited list of characters which are to be considered as range indicators. The regular version of this command replaces the current setting, the starred version appends its argument to the current list. The default setting is:

```
\DeclareRangeChars{~,;+/-}
```

This means that strings like ‘3–5’, ‘35+’, ‘8/9’ and so on will be considered as a range by `\ifnumerals`. See also sections 2.3.9 and 3.II.3 for further details.

`\DeclareRangeCommands{⟨commands⟩}`
`\DeclareRangeCommands*{⟨commands⟩}`

This command is similar to `\DeclareRangeChars`, except that the `⟨commands⟩` argument is an undelimited list of commands which are to be considered as range indicators. The regular version of this command replaces the current setting, the starred version appends its argument to the current list. The default list is rather long and should cover all common cases; here is a shorter example:

```
\DeclareRangeCommands{\&\bibrangedash\textendash\textemdash}
```

See also sections 2.3.9 and 3.II.3 for further details.

`\NumCheckSetup{⟨code⟩}`

Use this command to temporarily disable or redefine any commands which may interfere with the tests performed by `\ifnumeral` and `\ifnumerals` from section 4.5.2, which are also used by `\mkpageprefix` and `\mkpagetotal`. The `⟨code⟩` will be executed in a group by these commands. Since the above mentioned commands will expand the string to be analyzed, it is possible to remove commands to be ignored by the tests by making them expand to an empty string. See also sections 2.3.9 and 3.II.3 for further details.

`\DeclareCaseLangs{⟨languages⟩}`
`\DeclareCaseLangs*{⟨languages⟩}`

Defines the list of languages which are considered by the `\MakeSentenceCase*` command as it converts a string to sentence case. The `⟨languages⟩` argument is a comma-separated list of babel languages identifiers. The regular version of this command replaces the current setting, the starred version appends its argument to the current list. The default setting is:

```
\DeclareCaseLangs{%  
  american,british,canadian,english,australian,newzealand,  
  USenglish,UKenglish}
```

See the babel manual and table 1 on page 23 for a list of languages identifiers.

`\BibliographyWarning{⟨message⟩}`

This command is similar to `\PackageWarning` but prints the entry key of the entry currently being processed in addition to the input line number. It may be used in the bibliography as well as in citation commands. If the `⟨message⟩` is fairly long, use `\MessageBreak` to include line breaks. Note that the standard `\PackageWarning` command does not provide a meaningful clue when used in the bibliography since the input line number is the line on which the `\printbibliography` command was given.

`\pagetrackertrue`
`\pagetrackerfalse` These commands activate or deactivate the citation tracker locally (this will affect the `\iffirstonpage` and `\ifsamepage` test from section 4.5.2). They are intended for use in the definition of citation commands. If a citation command is to be excluded from page tracking, use `\pagetrackerfalse` in the `⟨precode⟩` argument of `\DeclareCiteCommand`. See section 4.3.1 for details. Note that these commands have no effect if page tracking has been disabled globally.

`\citetrackertrue`
`\citetrackerfalse` These commands activate or deactivate all citation trackers locally (this will affect the `\ifciteseen`, `\ifentryseen`, `\ifciteibid`, and `\ifciteidem` tests from section 4.5.2). They are intended for use in the definition of citation commands. If a citation command is to be excluded from tracking, use `\citetrackerfalse` in the `⟨precode⟩` argument of `\DeclareCiteCommand`. See section 4.3.1 for details. Note that these commands have no effect if tracking has been disabled globally.

4.6 Punctuation and spacing

The `biblatex` package provides elaborate facilities designed to manage and track punctuation and spacing in the bibliography and in citations. These facilities work on two levels. The high-level commands discussed in section 4.6.1 deal with punctuation and whitespace inserted by the bibliography style between the individual segments of a bibliography entry. The commands in sections 4.6.2, 4.6.3, and 4.6.4 work at a lower level. They use TeX's `space factor` and `modified space factor` codes to track punctuation in a robust and efficient way. This way it is possible to detect trailing punctuation marks within fields, not only those explicitly inserted between fields. The same technique is also used for automatic capitalization of bibliography strings, see `\DeclareCapitalPunctuation` in section 4.6.5 as well as section 4.7 for details. Note that these facilities are only made available locally in citations and bibliographies. They will not affect any other part of a document.

4.6.1 Block and unit punctuation

The major segments of a bibliography entry are ‘blocks’ and ‘units’. A block is the larger segment of the two, a unit is shorter or at most equal in length. For example, the values of fields such as `title` or `note` usually form a unit which is separated from subsequent data by a period or a comma. A block may comprise several fields which are treated as separate units, for example `publisher`, `location`, and `year`. The segmentation of an entry into blocks and units is at the discretion of the bibliography style. An entry is segmented by inserting `\newblock` and `\newunit`

commands at suitable places and `\finentry` at the very end (see 4.2.3 for an example). See also section 4.10.4 for some practical hints.

`\newblock` Records the end of a block. This command does not print anything, it merely marks the end of the block. The block delimiter `\newblockpunct` will be inserted by a subsequent `\printtext`, `\printfield`, `\printlist`, `\printnames`, or `\bibstring` command. You may use `\newblock` at suitable places without having to worry about spurious blocks. A new block will only be started by the next `\printfield` (or similar) command if this command actually prints anything. See section 4.10.4 for further details.

`\newunit` Records the end of a unit and puts the default delimiter `\newunitpunct` in the punctuation buffer. This command does not print anything, it merely marks the end of the unit. The punctuation buffer will be inserted by the next `\printtext`, `\printfield`, `\printlist`, `\printnames`, or `\bibstring` command. You may use `\newunit` after commands like `\printfield` without having to worry about spurious punctuation and whitespace. The buffer will only be inserted by the next `\printfield` or similar command if *both* fields are non-empty. This also applies to `\printtext`, `\printlist`, `\printnames`, and `\bibstring`. See section 4.10.4 for further details.

`\finentry` Inserts `\finentrypunct`. This command should be used at the very end of every bibliography entry.

`\setunit`{*punctuation*}

`\setunit*`{*punctuation*}

The `\setunit` command is similar to `\newunit` except that it uses *punctuation* instead of `\newunitpunct`. The starred variant differs from the regular version in that it checks if the last `\printtext`, `\printfield`, `\printlist`, `\printnames`, or `\bibstring` command did actually print anything. If not, it does nothing.

`\setpunctfont`{*command*}

This command, which is intended for use in field formatting directives, provides an alternative way of dealing with unit punctuation after a field printed in a different font (for example, a title printed in italics). The standard LaTeX way of dealing with this is adding a small amount of space, the so-called italic correction. This command allows adapting the punctuation to the font of the preceding field. The *command* should be a text font command which takes one argument, such as `\emph` or `\textbf`. This command will only affect punctuation marks inserted by one of the commands from section 4.6.3. The font adaption is applied to the next punctuation mark only and will be reset automatically thereafter. If you want to reset it manually before it takes effect, issue `\resetpunctfont`. If the `punctfont` package option is disabled, this command does nothing. Note that the `\mkbibemph` wrapper from section 4.9.4 incorporates this feature by default.

`\resetpunctfont` This command resets the unit punctuation font defined with `\setpunctfont` before it takes effect. If the `punctfont` package option is disabled, this command does nothing.

4.6.2 Punctuation tests

The following commands may be used to test for preceding punctuation marks at any point in citations and the bibliography.

`\ifpunct{⟨true⟩}{⟨false⟩}`

Executes `⟨true⟩` if preceded by any punctuation mark except for an abbreviation dot, and `⟨false⟩` otherwise.

`\ifterm{⟨true⟩}{⟨false⟩}`

Executes `⟨true⟩` if preceded by a terminal punctuation mark, and `⟨false⟩` otherwise. A terminal punctuation mark is any punctuation mark which has been registered for automatic capitalization, either with `\DeclareCapitalPunctuation` or by default, see section 4.6.5 for details. By default, this applies to periods, exclamation marks, and question marks.

`\ifpunctmark{⟨character⟩}{⟨true⟩}{⟨false⟩}`

Executes `⟨true⟩` if preceded by the punctuation mark `⟨character⟩`, and `⟨false⟩` otherwise. The `⟨character⟩` may be a comma, a semicolon, a colon, a period, an exclamation mark, a question mark, or an asterisk. Note that a period denotes an end-of-sentence period. Use the asterisk to test for the dot after an abbreviation. If this command is used in a formatting directive for name lists, i. e., in the argument to `\DeclareNameFormat`, the `⟨character⟩` may also be an apostrophe.

4.6.3 Adding punctuation

The following commands are designed to prevent double punctuation marks. Bibliography and citation styles should always use these commands instead of literal punctuation marks. All `\add. . .` commands in this section automatically remove preceding whitespace with `\unspace` (see section 4.6.4). Note that the behavior of all `\add. . .` commands discussed below is the package default, which is restored whenever `biblatex` switches languages. This behavior may be adjusted with `\DeclarePunctuationPairs` from section 4.6.5.

- `\adddot` Adds a period unless it is preceded by any punctuation mark. The purpose of this command is inserting the dot after an abbreviation. Any dot inserted this way is recognized as such by the other punctuation commands. This command may also be used to turn a previously inserted literal period into an abbreviation dot.
- `\addcomma` Adds a comma unless it is preceded by another comma, a semicolon, a colon, or a period.
- `\addsemicolon` Adds a semicolon unless it is preceded by a comma, another semicolon, a colon, or a period.
- `\addcolon` Adds a colon unless it is preceded by a comma, a semicolon, another colon, or a period.
- `\addperiod` Adds a period unless it is preceded by an abbreviation dot or any other punctuation

mark. This command may also be used to turn a previously inserted abbreviation dot into a period, for example at the end of a sentence.

`\addexclam` Adds an exclamation mark unless it is preceded by any punctuation mark except for an abbreviation dot.

`\addquestion` Adds a question mark unless it is preceded by any punctuation mark except for an abbreviation dot.

`\isdot` Turns a previously inserted literal period into an abbreviation dot. In contrast to `\adddot`, nothing is inserted if this command is not preceded by a period.

`\nopunct` Adds an internal marker which will cause the next punctuation command to print nothing.

4.6.4 Adding whitespace

The following commands are designed to prevent spurious whitespace. Bibliography and citation styles should always use these commands instead of literal whitespace. In contrast to the commands in sections 4.6.2 and 4.6.3, they are not restricted to citations and the bibliography but available globally.

`\unspace` Removes preceding whitespace, i. e., removes all skips and penalties from the end of the current horizontal list. This command is implicitly executed by all of the following commands.

`\addspace` Adds a breakable interword space.

`\addnbspace` Adds a non-breakable interword space.

`\addthinspace` Adds a *breakable* thin space.

`\addnbthinspace` Adds a non-breakable thin space. This is similar to `\,` and `\thinspace`.

`\addlowpenspace` Adds a space penalized by the value of the `lownamepenalty` counter, see sections 3.8.3 and 4.9.3 for details.

`\addhighpenspace` Adds a space penalized by the value of the `highnamepenalty` counter, see sections 3.8.3 and 4.9.3 for details.

`\addlpthinspace` Similar to `\addlowpenspace` but adds a breakable thin space.

`\addhpthinspace` Similar to `\addhighpenspace` but adds a breakable thin space.

`\addabbrvspace` Adds a space penalized by the value of the `abbrvpenalty` counter, see sections 3.8.3 and 4.9.3 for details.

`\addabthinspace` Similar to `\addabbrvspace` but using a thin space.

`\adddotSPACE` Executes `\adddot` and adds a space penalized by the value of the `abbrvpenalty` counter, see sections 3.8.3 and 4.9.3 for details.

`\addslash` Adds a breakable slash. This command differs from the `\slash` command in the LaTeX kernel in that a linebreak after the slash is not penalized at all.

Note that the commands in this section implicitly execute `\unspace` to remove spurious whitespace, hence they may be used to override each other. For example, you may use `\addnbspace` to transform a previously inserted interword space into a non-breakable one and `\addspace` to turn a non-breakable space into a breakable one.

4.6.5 Configuring punctuation and capitalization

The following commands configure various features related to punctuation and automatic capitalization.

`\DeclareAutoPunctuation{<characters>}`

This command defines the punctuation marks to be considered by the citation commands as they scan ahead for punctuation. Note that `<characters>` is an unlimited list of characters. Valid `<characters>` are period, comma, semicolon, colon, exclamation and question mark. The default setting is:

```
\DeclareAutoPunctuation{.,;:!?}
```

This definition is restored automatically whenever the `autopunct` package option is set to `true`. Executing `\DeclareAutoPunctuation{}` is equivalent to setting `autopunct=false`, i. e., it disables this feature.

`\DeclareCapitalPunctuation{<characters>}`

When `biblatex` inserts bibliography strings, i. e., key terms such as ‘edition’ or ‘volume’, it automatically capitalizes them after terminal punctuation marks. This command defines the punctuation marks which will cause bibliography strings to be capitalized if one of them precedes a string. Note that `<characters>` is an unlimited list of characters. Valid `<characters>` are period, comma, semicolon, colon, exclamation and question mark. The package default is:

```
\DeclareCapitalPunctuation{.!?}
```

Executing `\DeclareCapitalPunctuation{}` would be equivalent to disabling automatic capitalization. Since this feature is language-specific, this command must be used in the argument to `\DefineBibliographyExtras` (when used in the preamble) or `\DeclareBibliographyExtras` (when used in a localization module). See sections 3.7 and 4.8 for details. By default, strings are capitalized after periods, exclamation marks, and question marks. All strings are generally capitalized at the beginning of a paragraph (in fact whenever TeX is in vertical mode).

`\DeclarePunctuationPairs{<identifier>}{<characters>}`

Use this command to declare valid pairs of punctuation marks. This will affect the punctuation commands discussed in section 4.6.3. For example, the description of `\addcomma` states that this command adds a comma unless it is preceded by another comma, a semicolon, a colon, or a period. In other words, commas after abbreviation dots, exclamation marks, and question marks are permitted. These valid pairs are declared as follows:

```
\DeclarePunctuationPairs{comma}{*!?
```

The *⟨identifier⟩* selects the command to be configured. The identifiers correspond to the names of the punctuation commands from section 4.6.3 without the `\add` prefix, i.e., valid *⟨identifier⟩* strings are `dot`, `comma`, `semicolon`, `colon`, `period`, `exclam`, `question`. The *⟨characters⟩* argument is an undelimited list of punctuation marks. Valid *⟨characters⟩* are `comma`, `semicolon`, `colon`, `period`, `exclamation mark`, `question mark`, and `asterisk`. A period in the *⟨characters⟩* argument denotes an end-of-sentence period, an asterisk the dot after an abbreviation. This is the default setup, which is automatically restored whenever `biblatex` switches languages and corresponds to the behavior described in section 4.6.3:

```
\DeclarePunctuationPairs{dot}{}
\DeclarePunctuationPairs{comma}{*!?!}
\DeclarePunctuationPairs{semicolon}{*!?!}
\DeclarePunctuationPairs{colon}{*!?!}
\DeclarePunctuationPairs{period}{}
\DeclarePunctuationPairs{exclam}{*}
\DeclarePunctuationPairs{question}{*}
```

Since this feature is language-specific, `\DeclarePunctuationPairs` must be used in the argument to `\DefineBibliographyExtras` (when used in the preamble) or `\DeclareBibliographyExtras` (when used in a localization module). See sections 3.7 and 4.8 for details. Note that some localization modules may use a setup which is different from the package default.¹

```
\DeclareQuotePunctuation{⟨characters⟩}
```

This command controls ‘American-style’ punctuation. The `\mkbibquote` wrapper from section 4.9.4 can interact with the punctuation facilities discussed in sections 4.6.1, 4.6.3, and 4.6.4. Trailing punctuation marks after `\mkbibquote` will be moved inside the quotes inserted by `\mkbibquote` if they have been registered with `\DeclareQuotePunctuation`. Note that *⟨characters⟩* is an undelimited list of characters. Valid *⟨characters⟩* are `period`, `comma`, `semicolon`, `colon`, `exclamation` and `question mark`. Here is an example:

```
\DeclareQuotePunctuation{.,}
```

Executing `\DeclareQuotePunctuation{}` is equivalent to disabling this feature. This is the package default. Since this feature is language-specific, this command must be used in the argument to `\DefineBibliographyExtras` (when used in the preamble) or `\DeclareBibliographyExtras` (when used in a localization module). See sections 3.7 and 4.8 for details. See also section 3.9.1.

`\uspunctuation` A shorthand which uses the lower-level commands `\DeclareQuotePunctuation` and `\DeclarePunctuationPairs` to activate ‘American-style’ punctuation. See section 3.9.1 for details. This shorthand is provided for convenience only. The effective settings are applied by the lower-level commands.

¹ As of this writing, the `american` module uses different settings for ‘American-style’ punctuation.

`\stdpunctuation` Undoes the settings applied by `\uspunctuation`, restoring standard punctuation. As standard punctuation is the default setting, you only need this command to override a previously executed `\uspunctuation` command. See section 3.9.1 for details.

4.6.6 Correcting punctuation tracking

The facilities for punctuation tracking and automatic capitalization are very reliable under normal circumstances, but there are always marginal cases which may require manual intervention. Typical cases are bibliography strings printed as the first word in a footnote (which is usually treated as the beginning of a paragraph as far as capitalization is concerned, but TeX is not in vertical mode at this point) or punctuation after periods which are not really end-of-sentence periods (for example, after an ellipsis like “[...]” a command such as `\addperiod` would do nothing since parentheses and brackets are transparent to the punctuation tracker). In such cases, use the following commands in bibliography and citation styles to mark the beginning or middle of a sentence if and where required:

`\bibsentence` This command marks the beginning of a sentence. A bibliography string immediately after this command will be capitalized and the punctuation tracker is reset, i. e., this command hides all preceding punctuation marks from the punctuation tracker and enforces capitalization.

`\midsentence` This command marks the middle of a sentence. A bibliography string immediately after this command will not be capitalized and the punctuation tracker is reset, i. e., this command hides all preceding punctuation marks from the punctuation tracker and suppresses capitalization.

`\midsentence*` The starred variant of `\midsentence` differs from the regular one in that a preceding abbreviation dot is not hidden from the the punctuation tracker, i. e., any code after `\midsentence*` will see a preceding abbreviation dot. All other punctuation marks are hidden from the punctuation tracker and capitalization is suppressed.

4.7 Bibliography strings

Bibliography strings are key terms such as ‘edition’ or ‘volume’ which are automatically translated by `biblatex`’s localization modules. See section 4.8 for an overview and 4.8.2 for a list of all strings supported by default. The commands in this section are used to print the localized term.

`\bibstring`[*wrapper*]{*key*}

Prints the bibliography string *key*, where *key* is an identifier in lowercase letters (see section 4.8.2). The term will be capitalized as required, see section 4.6.5 for details. If the *wrapper* argument is given, the string is passed to *wrapper* as an argument. This is intended for font commands such as `\emph`.

`\bibcpstring`[*wrapper*]{*key*}

This command is similar to `\bibstring`, but the term is always capitalized.

`\bibucstring[wrapper]{key}`

This command is similar to `\bibstring`, but the whole term is uppercased.

`\biblstring[wrapper]{key}`

This command is similar to `\bibstring`, but the whole term is lowercased.

`\bibxstring{key}`

A simplified but expandable version of `\bibstring`. Note that this variant does not capitalize automatically, nor does it hook into the punctuation tracker. It is intended for special cases in which an expanded bibliography string is required in a test, but is not printed.

4.8 Localization modules

A localization module provides translations for key terms such as ‘edition’ or ‘volume’ as well as definitions for language-specific features such as the date format and ordinals. These definitions are provided in files with the suffix `lbx`. The base name of the file must be a language name known to the `babel` package. The `lbx` files may also be used to map `babel`’s language names to the backend modules of the `biblatex` package. All localization modules are loaded on demand in the document body. Note that the contents of the file are processed in a group and that the category code of the character `@` is temporarily set to ‘letter’.

4.8.1 Localization commands

The user-level versions of the localization commands were already introduced in section 3.7. When used in `lbx` files, however, the syntax of localization commands is different from the user syntax in the preamble and the configuration file. When used in localization files, there is no need to specify the `<language>` because the mapping of strings to a language is already provided by the name of the `lbx` file.

`\DeclareBibliographyStrings{definitions}`

This command is only available in `lbx` files. It is used to define bibliography strings. The `<definitions>` consist of `<key>=value` pairs which assign an expression to an identifier. A complete list of all keys supported by default is given in section 4.8.2. Note that the syntax of the value is different in `lbx` files. The value assigned to a key consists of two expressions, each of which is wrapped in an additional pair of brackets. This is best shown by example:

```
\DeclareBibliographyStrings{%
  bibliography = {{Bibliography}{Bibliography}},
  shorthands   = {{List of Abbreviations}{Abbreviations}},
  editor       = {{editor}{ed.}},
  editors      = {{editors}{eds.}},
}
```

The first value is the long, written out expression, the second one is an abbreviated or short form. Both strings must always be given even though they may be identical if an expression is always (or never) abbreviated. Depending on the setting of the

abbreviate package option (see section 3.1.2), biblatex selects one expression when loading the lbx file. There is also a special key named `inherit` which copies the strings from a different language. This is intended for languages which only differ in a few expressions, such as German and Austrian or American and British English. For example, here are the complete definitions for Austrian:

```
\DeclareBibliographyStrings{%
  inherit      = {german},
  january      = {{J"anner}{J"an.}},
}
```

The above examples are slightly simplified. Real localization files should use the punctuation and formatting commands discussed in sections 4.6.3 and 3.8 instead of literal punctuation. Here is an excerpt from a real localization file:

```
bibliography      = {{Bibliography}{Bibliography}},
shorthands        = {{List of Abbreviations}{Abbreviations}},
editor            = {{editor}{ed\adddot}},
editors           = {{editors}{eds\adddot}},
byeditor          = {{edited by}{ed\adddot\space by}},
mathesis          = {{Master's thesis}{MA\addabbrvspace thesis}},
```

Note the handling of abbreviation dots, the spacing in abbreviated expressions, and the capitalization in the example above. All expressions should be capitalized as they usually are when used in the middle of a sentence. The biblatex package will automatically capitalize the first word when required at the beginning of a sentence, see `\DeclareCapitalPunctuation` in section 4.6.5 for details. Expressions intended for use in headings are special. They should be capitalized in a way that is suitable for titling and should not be abbreviated (but they may have a short form).

`\InheritBibliographyStrings{<language>}`

This command is only available in lbx files. It copies the bibliography strings for `<language>` to the current language, as specified by the name of the lbx file.

`\DeclareBibliographyExtras{<code>}`

This command is only available in lbx files. It is used to adapt language-specific features such as the date format and ordinals. The `<code>`, which may be arbitrary LaTeX code, will usually consist of redefinitions of the formatting commands from section 4.9.2.

`\UndeclareBibliographyExtras{<code>}`

This command is only available in lbx files. It is used to restore any formatting commands modified with `\DeclareBibliographyExtras`. If a redefined command is included in section 4.9.2, there is no need to restore its previous definition since these commands are localized by all language modules anyway.

`\InheritBibliographyExtras{⟨language⟩}`

This command is only available in lbx files. It copies the bibliography extras for `⟨language⟩` to the current language, as specified by the name of the lbx file.

`\DeclareHyphenationExceptions{⟨text⟩}`

This command corresponds to `\DefineHyphenationExceptions` from section 3.7. The difference is that it is only available in lbx files and that the `⟨language⟩` argument is omitted. The hyphenation exceptions will affect the language of the lbx file currently being processed.

`\DeclareLanguageMapping{⟨language⟩}{⟨file⟩}`

This command maps a babel language identifier to an lbx file. The `⟨language⟩` must be a language name known to the babel package, i. e., one of the identifiers listed in table 1 on page 23. The `⟨file⟩` argument is the name of an alternative lbx file without the `.lbx` suffix. Declaring the same mapping more than once is possible. Subsequent declarations will simply overwrite any previous ones. This command may only be used in the preamble. See section 4.10.7 for further details.

`\NewBibliographyString{⟨key⟩}`

This command, which may be used in the preamble (including cbx and bbx files) as well as in lbx files, initializes a new bibliography string, i. e., it adds a `⟨key⟩` to be used in the `⟨definitions⟩` of `\DeclareBibliographyStrings`. The keys listed in section 4.8.2 are defined by default.

4.8.2 Localization keys

The localization keys in this section are defined by default and covered by the localization files which come with bibl_{at}ex. Note that these strings are only available in citations, the bibliography, and the list of shorthands. All expressions should be capitalized as they usually are when used in the middle of a sentence. bibl_{at}ex will capitalize them automatically at the beginning of a sentence. The only exceptions to these rules are the three strings intended for use in headings.

Headings

The following strings are special because they are intended for use in headings and made available globally via macros. For this reason, they should be capitalized for use in headings and they must not include any local commands which are part of bibl_{at}ex's author interface.

<code>bibliography</code>	The term 'bibliography', also available as <code>\bibname</code> .
<code>references</code>	The term 'references', also available as <code>\refname</code> .
<code>shorthands</code>	The term 'list of shorthands' or 'list of abbreviations', also available as <code>\losname</code> .

Roles, expressed as functions

The following keys refer to roles which are expressed as a function ('editor', 'translator') rather than as an action ('edited by', 'translated by').

<code>editor</code>	Essentially, the purpose of this string is to provide the translation of the term ‘editor’. However, this string is not a translation but rather a pointer to an editorial role specified by <code>typeeditor</code> or some other <code>type...key</code> .
<code>editors</code>	The plural version of <code>editor</code> .
<code>typeeditor</code>	The term ‘editor’.
<code>typeeditors</code>	The plural form ‘editors’.
<code>typecompiler</code>	The term ‘compiler’.
<code>typecompilers</code>	The plural form ‘compilers’.
<code>translator</code>	The term ‘translator’.
<code>translators</code>	The plural form ‘translators’.
<code>redactor</code>	The term ‘redactor’, referring to a secondary editor.
<code>redactors</code>	The plural form ‘redactors’.
<code>commentator</code>	The term ‘commentator’, referring to the author of a commentary to a work.
<code>commentators</code>	The plural form ‘commentators’.
<code>annotator</code>	The term ‘annotator’, referring to the author of annotations to a work.
<code>annotators</code>	The plural form ‘annotators’.

Concatenated editor roles, expressed as functions

The following keys are similar in function to `editor`, `translator`, etc. They are used to indicate additional roles of the editor, e. g., ‘editor and translator’, ‘editor and foreword’.

<code>editortr</code>	Used if the fields <code>editor/translator</code> are identical.
<code>editorstr</code>	The plural form of <code>editortr</code> .
<code>editorco</code>	Used if the fields <code>editor/commentator</code> are identical.
<code>editorsco</code>	The plural form of <code>editorco</code> .
<code>editoran</code>	Used if the fields <code>editor/annotator</code> are identical.
<code>editorsan</code>	The plural form of <code>editoran</code> .
<code>editorin</code>	Used if the fields <code>editor/introduction</code> are identical.
<code>editorsin</code>	The plural form of <code>editorin</code> .
<code>editorfo</code>	Used if the fields <code>editor/foreword</code> are identical.
<code>editorsfo</code>	The plural form of <code>editorfo</code> .
<code>editoraf</code>	Used if the fields <code>editor/aftword</code> are identical.
<code>editorsaf</code>	The plural form of <code>editoraf</code> .

Keys for `editor/translator/⟨role⟩` combinations:

<code>editortrco</code>	Used if the fields <code>editor/translator/commentator</code> are identical.
<code>editorstrco</code>	The plural form of <code>editortrco</code> .
<code>editortran</code>	Used if the fields <code>editor/translator/annotator</code> are identical.
<code>editorstran</code>	The plural form of <code>editortran</code> .
<code>editortrin</code>	Used if the fields <code>editor/translator/introduction</code> are identical.
<code>editorstrin</code>	The plural form of <code>editortrin</code> .
<code>editortrfo</code>	Used if the fields <code>editor/translator/foreword</code> are identical.
<code>editorstrfo</code>	The plural form of <code>editortrfo</code> .
<code>editortraf</code>	Used if the fields <code>editor/translator/aftword</code> are identical.
<code>editorstraf</code>	The plural form of <code>editortraf</code> .

Keys for editor/commentator/⟨role⟩ combinations:

<code>editorcoin</code>	Used if the fields editor/commentator/introduction are identical.
<code>editorscoin</code>	The plural form of editorcoin.
<code>editorcofo</code>	Used if the fields editor/commentator/foreword are identical.
<code>editorscofo</code>	The plural form of editorcofo.
<code>editorcoaf</code>	Used if the fields editor/commentator/aftword are identical.
<code>editorscoaf</code>	The plural form of editorcoaf.

Keys for editor/annotator/⟨role⟩ combinations:

<code>editoranin</code>	Used if the fields editor/annotator/introduction are identical.
<code>editorsanin</code>	The plural form of editoranin.
<code>editoranfo</code>	Used if the fields editor/annotator/foreword are identical.
<code>editorsanfo</code>	The plural form of editoranfo.
<code>editoranaf</code>	Used if the fields editor/annotator/aftword are identical.
<code>editorsanaf</code>	The plural form of editoranaf.

Keys for editor/translator/commentator/⟨role⟩ combinations:

<code>editortrcoin</code>	Used if the fields editor/translator/commentator/introduction are identical.
<code>editorstrcoin</code>	The plural form of editortrcoin.
<code>editortrcofo</code>	Used if the fields editor/translator/commentator/foreword are identical.
<code>editorstrcofo</code>	The plural form of editortrcofo.
<code>editortrcoaf</code>	Used if the fields editor/translator/commentator/aftword are identical.
<code>editorstrcoaf</code>	The plural form of editortrcoaf.

Keys for editor/annotator/commentator/⟨role⟩ combinations:

<code>editortranin</code>	Used if the fields editor/annotator/commentator/introduction are identical.
<code>editorstranin</code>	The plural form of editortranin.
<code>editortranfo</code>	Used if the fields editor/annotator/commentator/foreword are identical.
<code>editorstranfo</code>	The plural form of editortranfo.
<code>editortranaf</code>	Used if the fields editor/annotator/commentator/aftword are identical.
<code>editorstranaf</code>	The plural form of editortranaf.

Concatenated translator roles, expressed as functions

The following keys are similar in function to `translator`. They are used to indicate additional roles of the translator, e. g., ‘translator and commentator’, ‘translator and introduction’.

<code>translatorco</code>	Used if the fields translator/commentator are identical.
<code>translatorsco</code>	The plural form of translatorco.
<code>translatoran</code>	Used if the fields translator/annotator are identical.
<code>translatorsan</code>	The plural form of translatoran.
<code>translatorin</code>	Used if the fields translator/introduction are identical.
<code>translatorsin</code>	The plural form of translatorin.
<code>translatorfo</code>	Used if the fields translator/foreword are identical.
<code>translatorsfo</code>	The plural form of translatorfo.
<code>translatoraf</code>	Used if the fields translator/aftword are identical.

<code>translatorsaf</code>	The plural form of <code>translatoraf</code> .
	Keys for <code>translator/commentator/⟨role⟩</code> combinations:
<code>translatorcoin</code>	Used if the fields <code>translator/commentator/introduction</code> are identical.
<code>translatorscoin</code>	The plural form of <code>translatorcoin</code> .
<code>translatorcofo</code>	Used if the fields <code>translator/commentator/foreword</code> are identical.
<code>translatorscofo</code>	The plural form of <code>translatorcofo</code> .
<code>translatorcoaf</code>	Used if the fields <code>translator/commentator/aftword</code> are identical.
<code>translatorscoaf</code>	The plural form of <code>translatorcoaf</code> .

Keys for `translator/annotator/⟨role⟩` combinations:

<code>translatoranin</code>	Used if the fields <code>translator/annotator/introduction</code> are identical.
<code>translatorsanin</code>	The plural form of <code>translatoranin</code> .
<code>translatoranfo</code>	Used if the fields <code>translator/annotator/foreword</code> are identical.
<code>translatorsanfo</code>	The plural form of <code>translatoranfo</code> .
<code>translatoranaf</code>	Used if the fields <code>translator/annotator/aftword</code> are identical.
<code>translatorsanaf</code>	The plural form of <code>translatoranaf</code> .

Roles, expressed as actions

The following keys refer to roles which are expressed as an action ('edited by', 'translated by') rather than as a function ('editor', 'translator').

<code>byauthor</code>	The expression '[bytype. . .] by [name]'. This string is a pointer to <code>bytypeauthor</code> or some other <code>bytype. . .</code> key.
<code>bytypeauthor</code>	The term 'by [name]'.
<code>byeditor</code>	The expression '[bytype. . .] by [name]'. This string is a pointer to <code>bytypeeditor</code> or some other <code>bytype. . .</code> key.
<code>bytypeeditor</code>	The expression 'edited [by name]'.
<code>bytypecompiler</code>	The expression 'compiled [by name]'.
<code>bytranslator</code>	The expression 'translated by [name]' or 'translated from [language] by [name]'.
<code>byredactor</code>	The expression 'redacted by [name]', referring to a secondary editor.
<code>bycommentator</code>	The expression 'commented by [name]' in the sense of 'furnished with a commentary'.
<code>byannotator</code>	The expression 'annotated by [name]' in the sense of 'furnished with annotations'.

Concatenated editor roles, expressed as actions

The following keys are similar in function to `byeditor`, `bytranslator`, etc. They are used to indicate additional roles of the editor, e. g., 'edited and translated [by name]', 'edited and furnished with an introduction [by name]', 'edited, with a foreword, [by name]'.

<code>byeditortr</code>	Used if the fields <code>editor/translator</code> are identical.
<code>byeditorco</code>	Used if the fields <code>editor/commentator</code> are identical.
<code>byeditoran</code>	Used if the fields <code>editor/annotator</code> are identical.
<code>byeditorin</code>	Used if the fields <code>editor/introduction</code> are identical.
<code>byeditorfo</code>	Used if the fields <code>editor/foreword</code> are identical.
<code>byeditoraf</code>	Used if the fields <code>editor/aftword</code> are identical.

Keys for editor/translator/⟨role⟩ combinations:

- byeditortrco Used if the fields editor/translator/commentator are identical.
- byeditortran Used if the fields editor/translator/annotator are identical.
- byeditortrin Used if the fields editor/translator/introduction are identical.
- byeditortrfo Used if the fields editor/translator/foreword are identical.
- byeditortraf Used if the fields editor/translator/aftword are identical.

Keys for editor/commentator/⟨role⟩ combinations:

- byeditorcoin Used if the fields editor/commentator/introduction are identical.
- byeditorcofo Used if the fields editor/commentator/foreword are identical.
- byeditorcoaf Used if the fields editor/commentator/aftword are identical.

Keys for editor/annotator/⟨role⟩ combinations:

- byeditoranin Used if the fields editor/annotator/introduction are identical.
- byeditoranfo Used if the fields editor/annotator/foreword are identical.
- byeditoranaf Used if the fields editor/annotator/aftword are identical.

Keys for editor/translator/commentator/⟨role⟩ combinations:

- byeditortrcoin Used if the fields editor/translator/commentator/introduction are identical.
- byeditortrcofo Used if the fields editor/translator/commentator/foreword are identical.
- byeditortrcoaf Used if the fields editor/translator/commentator/aftword are identical.

Keys for editor/translator/annotator/⟨role⟩ combinations:

- byeditortranin Used if the fields editor/annotator/commentator/introduction are identical.
- byeditortranfo Used if the fields editor/annotator/commentator/foreword are identical.
- byeditortranaf Used if the fields editor/annotator/commentator/aftword are identical.

Concatenated translator roles, expressed as actions

The following keys are similar in function to bytranslator. They are used to indicate additional roles of the translator, e. g., ‘translated and commented [by name]’, ‘translated and furnished with an introduction [by name]’, ‘translated, with a foreword, [by name]’.

- bytranslatorco Used if the fields translator/commentator are identical.
- bytranslatoran Used if the fields translator/annotator are identical.
- bytranslatorin Used if the fields translator/introduction are identical.
- bytranslatorfo Used if the fields translator/foreword are identical.
- bytranslatoraf Used if the fields translator/aftword are identical.

Keys for translator/commentator/⟨role⟩ combinations:

- bytranslatorcoin Used if the fields translator/commentator/introduction are identical.
- bytranslatorcofo Used if the fields translator/commentator/foreword are identical.
- bytranslatorcoaf Used if the fields translator/commentator/aftword are identical.

Keys for translator/annotator/⟨role⟩ combinations:

- bytranslatoranin Used if the fields translator/annotator/introduction are identical.

- bytranslatoranfo** Used if the fields translator/annotator/foreword are identical.
bytranslatoranaf Used if the fields translator/annotator/aftword are identical.

Roles, expressed as objects

Roles which are related to supplementary material may also be expressed as objects ('with a commentary by') rather than as functions ('commentator') or as actions ('commented by').

- withcommentator** The expression 'with a commentary by [name]'.
withannotator The expression 'with annotations by [name]'.
withintroduction The expression 'with an introduction by [name]'.
withforeword The expression 'with a foreword by [name]'.
withafterword The expression 'with an afterword by [name]'.

Supplementary material

- commentary** The term 'commentary'.
annotations The term 'annotations'.
introduction The term 'introduction'.
foreword The term 'foreword'.
afterword The term 'afterword'.

Publication details

- volume** The term 'volume', referring to a book.
volumes The plural form 'volumes'.
jourvol The term 'volume', referring to a journal.
jourser The term 'series', referring to a journal.
newseries The expression 'new series', referring to a journal.
oldseries The expression 'old series', referring to a journal.
edition The term 'edition'.
in The term 'in', referring to the title of a work published as part of another one, e. g., '[title of article] in [title of journal]'.
inseries The term 'in', as used in expressions like 'volume [number] in [name of series]'.
ofseries The term 'of', as used in expressions like 'volume [number] of [name of series]'.
number The term 'number', referring to an issue of a journal.
chapter The term 'chapter', referring to a chapter in a book.
version The term 'version', referring to a revision number.
reprint The term 'reprint'.
reprintof The expression 'reprint of [title]'.
reprintas The expression 'reprinted as [title]'.

Pagination

- page** The term 'page'.
pages The plural form 'pages'.
column The term 'column', referring to a column on a page.
columns The plural form 'columns'.
section The term 'section', referring to a document division (usually abbreviated as §).

sections	The plural form ‘sections’ (usually abbreviated as §§).
paragraph	The term ‘paragraph’ (i. e., a block of text, not to be confused with section above).
paragraphs	The plural form ‘paragraphs’.
verse	The term ‘verse’, to be used when referring to a work which is cited by verse numbers rather than pages.
verses	The plural form ‘verses’.
line	The term ‘line’, referring to a numbered line of text.
lines	The plural form ‘lines’.

Types

The following keys are typically used in the type field of @thesis, @report, @misc, and other entries:

mathesis	An expression equivalent to the term ‘Master’s thesis’.
phdthesis	The term ‘PhD thesis’, ‘PhD dissertation’, ‘doctoral thesis’, etc.
techreport	The term ‘technical report’.
resreport	The term ‘research report’.
software	The term ‘computer software’.
datacd	The term ‘data CD’ or ‘CD-ROM’.
audiocd	The term ‘audio CD’.

Miscellaneous

and	The term ‘and’, as used in a list of authors or editors, for example.
andothers	The expression ‘and others’ or ‘et alii’, used to mark the truncation of a name list.
andmore	Like andothers but used to mark the truncation of a literal list.

Labels

The following strings are intended for use as labels, e. g., ‘Address: [url field]’ or ‘Abstract: [abstract field]’.

url	The term ‘address’ in the sense of an internet address.
urlseen	An expression like ‘accessed’, ‘retrieved’, ‘visited’, ‘last visited on’, etc., referring to the access date of an online resource.
file	The term ‘file’.
library	The term ‘library’.
abstract	The term ‘abstract’.
annotation	The term ‘annotations’.

Citations

Traditional scholarly expressions used in citations:

idem	The term equivalent to the Latin ‘idem’ (‘the same [person]’).
idemsf	The feminine singular form of ‘idem’.
idmsm	The masculine singular form of ‘idem’.
idmsn	The neuter singular form of ‘idem’.
idempf	The feminine plural form of ‘idem’.

idem^{pm}	The masculine plural form of 'idem'.
idem^{pn}	The neuter plural form of 'idem'.
idem^{pp}	The plural form of 'idem' suitable for a mixed gender list of names.
ibidem	The term equivalent to the Latin 'ibidem' ('in the same place').
opcit	The term equivalent to the Latin term 'opere citato' ('[in] the work [already] cited').
loccit	The term equivalent to the Latin term 'loco citato' ('[at] the place [already] cited').
confer	The term equivalent to the Latin 'confer' ('compare').
sequens	The term equivalent to the Latin 'sequens' ('[and] the following [page]'), as used to indicate a range of two pages when only the starting page is provided (e. g., '25 sq.' or '25 f.' instead of '25–26').
sequentes	The term equivalent to the Latin 'sequentes' ('[and] the following [pages]'), as used to indicate an open-ended range of pages when only the starting page is provided (e. g., '25 sqq.' or '25 ff.').
passim	The term equivalent to the Latin 'passim' ('throughout', 'here and there', 'scatteredly').

Other expressions frequently used in citations:

see	The term 'see'.
seealso	The expression 'see also'.
seenote	An expression like 'see note [footnote]' or 'as in [footnote]', used to refer to a previous footnote in a citation.
quotedin	An expression like 'quoted in [citation]', used when quoting a passage which was already a quotation in the cited work.
citedas	An expression like 'henceforth cited as [shorthand]', used to introduce a shorthand in a citation.
thiscite	The expression used in some verbose citation styles to differentiate between the page range of the cited item (typically an article in a journal, collection, or conference proceedings) and the page number the citation refers to. For example: "Author, Title, in: <i>Book</i> , pp. 45–61, thiscite p. 52."

Month names

january	The name 'January'.
february	The name 'February'.
march	The name 'March'.
april	The name 'April'.
may	The name 'May'.
june	The name 'June'.
july	The name 'July'.
august	The name 'August'.
september	The name 'September'.
october	The name 'October'.
november	The name 'November'.
december	The name 'December'.

Language names

<code>langamerican</code>	The language 'American' or 'American English'.
<code>langbrazilian</code>	The language 'Brazilian' or 'Brazilian Portuguese'.
<code>langdanish</code>	The language 'Danish'.
<code>langdutch</code>	The language 'Dutch'.
<code>langenglish</code>	The language 'English'.
<code>langfrench</code>	The language 'French'.
<code>langgerman</code>	The language 'German'.
<code>langgreek</code>	The language 'Greek'.
<code>langitalian</code>	The language 'Italian'.
<code>langlatin</code>	The language 'Latin'.
<code>langnorwegian</code>	The language 'Norwegian'.
<code>langportuguese</code>	The language 'Portuguese'.
<code>langspanish</code>	The language 'Spanish'.
<code>langswedish</code>	The language 'Swedish'.

The following keys provide expressions such as 'from [the] English', intended for use in phrases like 'translated from the English by [translator]':

<code>fromamerican</code>	Translations from American English.
<code>frombrazilian</code>	Translations from Brazilian Portuguese.
<code>fromdanish</code>	Translations from Danish.
<code>fromdutch</code>	Translations from Dutch.
<code>fromenglish</code>	Translations from English.
<code>fromfrench</code>	Translations from French.
<code>fromgerman</code>	Translations from German.
<code>fromgreek</code>	Translations from Greek.
<code>fromitalian</code>	Translations from Italian.
<code>fromlatin</code>	Translations from Latin.
<code>fromnorwegian</code>	Translations from Norwegian.
<code>fromportuguese</code>	Translations from Portuguese.
<code>fromspanish</code>	Translations from Spanish.
<code>fromswedish</code>	Translations from Swedish.

Country names

Country names are localized by using the string `country` plus the ISO-3166 country code as the key. The short version of the translation should be the ISO-3166 country code. Note that only a small number of country names is defined by default, mainly to illustrate this scheme. These keys are used in the `location` list of `@patent` entries but they may be useful for other purposes as well.

<code>countryde</code>	The name 'Germany', abbreviated as DE.
<code>countryeu</code>	The name 'European Union', abbreviated as EU.
<code>countryep</code>	Similar to <code>countryeu</code> but abbreviated as EP. This is intended for patent entries.
<code>countryfr</code>	The name 'France', abbreviated as FR.
<code>countryuk</code>	The name 'United Kingdom', abbreviated as GB.
<code>countryus</code>	The name 'United States of America', abbreviated as US.

Patents and patent requests

Strings related to patents are localized by using the term `patent` plus the ISO-3166 country code as the key. Note that only a small number of patent keys is defined by default, mainly to illustrate this scheme. These keys are used in the `type` field of `@patent` entries.

<code>patent</code>	The generic term ‘patent’.
<code>patentde</code>	The expression ‘German patent’.
<code>patenteu</code>	The expression ‘European patent’.
<code>patentfr</code>	The expression ‘French patent’.
<code>patentuk</code>	The expression ‘British patent’.
<code>patentus</code>	The expression ‘U.S. patent’.

Patent requests are handled in a similar way, using the string `pat req` as the base name of the key:

<code>patreq</code>	The generic term ‘patent request’.
<code>patreqde</code>	The expression ‘German patent request’.
<code>patreqeu</code>	The expression ‘European patent request’.
<code>patreqfr</code>	The expression ‘French patent request’.
<code>patrequk</code>	The expression ‘British patent request’.
<code>patrequs</code>	The expression ‘U.S. patent request’.

4.9 Formatting commands

This section corresponds to section 3.8 in the user part of this manual. Bibliography and citation styles should incorporate the commands and facilities discussed in this section in order to provide a certain degree of high-level configurability. Users should not be forced to write new styles if all they want to do is modify the spacing in the bibliography or the punctuation used in citations.

4.9.1 User-definable commands and hooks

This section corresponds to section 3.8.1 in the user part of the manual. The commands and hooks discussed here are meant to be redefined by users, but bibliography and citation styles may provide a default definition which is different from the package default. These commands are defined in `biblatex.def` to make it easier to look up the package defaults. Note that all commands starting with `\mk...` take one mandatory argument.

<code>\bibleftparen</code>	The opening parenthesis.
<code>\bibrightparen</code>	The closing parenthesis.
<code>\bibleftbracket</code>	The opening square bracket.
<code>\bibrightbracket</code>	The closing square bracket.
<code>\bibnamedash</code>	The dash to be used as a replacement for recurrent authors or editors in the bibliography. The default is an ‘em’ or an ‘en’ dash, depending on the indentation of the list of references.

- `\labelnamepunct` The separator to be printed after the name used for alphabetizing in the bibliography (author or editor, if the author field is undefined). Use this separator instead of `\newunitpunct` at this location. The default is `\newunitpunct`, i. e., it is not handled differently from regular unit punctuation but permits convenient reconfiguration.
- `\subtitlepunct` The separator to be printed between the fields `title` and `subtitle`, `booktitle` and `booksubtitle`, as well as `maintitle` and `mainsubtitle`. Use this separator instead of `\newunitpunct` at this location. The default is `\newunitpunct`, i. e., it is not handled differently from regular unit punctuation but permits convenient reconfiguration.
- `\bibpagespunct` The separator to be printed before the `pages` field. Use this separator instead of `\newunitpunct` at this location. The default is a comma plus an interword space.
- `\multinamedelim` The delimiter to be printed between multiple items in a name list like `author` or `editor` if there are more than two names in the list. If there are only two names in the list, use the `\finalnamedelim` instead. This command should be incorporated in all formatting directives for name lists.
- `\finalnamedelim` Use this command instead of `\multinamedelim` before the final name in a name list.
- `\revsdnamedelim` The extra delimiter to be printed after the first name in a name list (in addition to `\finalnamedelim`) if the first name is reversed. This command should be incorporated in all formatting directives for name lists.
- `\andothersdelim` The delimiter to be printed before the bibliography string ‘andothers’ if a name list like `author` or `editor` is truncated. This command should be incorporated in all formatting directives for name lists.
- `\multilistdelim` The delimiter to be printed between multiple items in a literal list like `publisher` or `location` if there are more than two names in the list. If there are only two items in the list, use the `\finalistdelim` instead. This command should be incorporated in all formatting directives for literal lists.
- `\finalistdelim` Use this command instead of `\multilistdelim` before the final item in a literal list.
- `\andmoredelim` The delimiter to be printed before the bibliography string ‘andmore’ if a literal list like `publisher` or `location` is truncated. This command should be incorporated in all formatting directives for literal lists.
- `\multicitedelim` The delimiter printed between citations if multiple entry keys are passed to a single citation command. This command should be incorporated in the definition of all citation commands, for example in the `<sepcode>` argument passed to `\DeclareCiteCommand`. See section 4.3.1 for details.
- `\supercitedelim` Similar to `\multinamedelim`, but intended for the `\supercite` command only.
- `\compcitedelim` Similar to `\multicitedelim`, but intended for citation styles which ‘compress’ mul-

tuple citations, i. e., print the author only once if subsequent citations share the same author etc.

`\nameyearim` The delimiter to be printed between the author or editor and the year. This command should be incorporated in the definition of all citation commands of author-year citation styles.

`\prenotedim` The delimiter to be printed after the *⟨prenote⟩* argument of a citation command.

`\postnotedim` The delimiter to be printed after the *⟨postnote⟩* argument of a citation command.

`\mkbibnamelast`{*⟨text⟩*}

Formatting hook for the last name, to be used in all formatting directives for name lists.

`\mkbibnamefirst`{*⟨text⟩*}

Similar to `\mkbibnamelast`, but intended for the first name.

`\mkbibnameprefix`{*⟨text⟩*}

Similar to `\mkbibnamelast`, but intended for the name prefix.

`\mkbibnameaffix`{*⟨text⟩*}

Similar to `\mkbibnamelast`, but intended for the name affix.

4.9.2 Language-specific commands

This section corresponds to section 3.8.2 in the user part of the manual. The commands discussed here are usually handled by the localization modules, but may also be redefined by users on a per-language basis. Note that all commands starting with `\mk...` take one mandatory argument.

`\bibrangedash` The language-specific range dash.

`\bibdatelong` The long date format. Note that this command takes no argument. It prints the date by using the day, month, and year fields of the current entry.

`\bibdateshort` Similar to `\bibdatelong`, but using the short date format.

`\biburldatelong` The long URL date format. Note that this command takes no argument. It prints the date by using the `urlday`, `urlmonth`, and `urlyear` fields of the current entry.

`\biburldateshort` Similar to `\biburldatelong`, but using the short URL date format.

`\finalandcomma` Prints the comma to be inserted before the final ‘and’ in an enumeration, if applicable in the respective language.

`\mkbibordinal`{*⟨integer⟩*}

Takes an integer argument and prints it as an ordinal number.

`\mkbibmascord`{*integer*}

Similar to `\mkbibordinal`, but prints a masculine ordinal, if applicable in the respective language.

`\mkbibfemord`{*integer*}

Similar to `\mkbibordinal`, but prints a feminine ordinal, if applicable in the respective language.

`\mkbibordedition`{*integer*}

Similar to `\mkbibordinal`, but intended for use with the term ‘edition’.

`\mkbibordseries`{*integer*}

Similar to `\mkbibordinal`, but intended for use with the term ‘series’.

4.9.3 User-definable lengths and counters

This section corresponds to section 3.8.3 in the user part of the manual. The length registers and counters discussed here are meant to be altered by users. Bibliography and citation styles should incorporate them where applicable and may also provide a default setting which is different from the package default.

`\bibhang` The hanging indentation of the bibliography, if applicable. Bibliography styles which use a `list` environment and do not print a label should incorporate this length register in the definition of `thebibliography`.

`\biblabelsep` The horizontal space between entries and their corresponding labels. Bibliography styles which use `list` environments and print a label should set `\labelsep` to `\biblabelsep` in the definition of the respective environment.

`\bibitemsep` The vertical space between the individual entries in the bibliography. Bibliography styles using `list` environments should set `\itemsep` to `\bibitemsep` in the definition of the respective environment.

`\bibparsep` The vertical space between paragraphs within an entry in the bibliography. Bibliography styles using `list` environments should set `\parsep` to `\bibparsep` in the definition of the respective environment.

`abbrvpenalty` The penalty used by `\addabbrvspace`, `\addabthinspace`, and `\adddotsspace`, see section 4.6.4 for details.

`lownamepenalty` The penalty used by `\addlowpenspace` and `\addlpthinspace`, see section 4.6.4 for details.

`highnamepenalty` The penalty used by `\addhighpenspace` and `\addhpthinspace`, see section 4.6.4 for details.

4.9.4 Auxiliary commands and hooks

The auxiliary commands and facilities in this section serve a special purpose. Some of them are used by `biblatex` to communicate with bibliography and citation styles in some way or other.

`\mkbibemph{<text>}`

A general purpose macro which prints its argument in italics. This is a simple wrapper around the standard `\emph` command. Apart from that, it uses `\setpunctfont` from section 4.6.1 to adapt the font of the next punctuation mark following the text set in italics. If the `punctfont` package option is disabled, this command behaves like `\emph`.

`\mkbibquote{<text>}`

A general purpose macro which wraps its argument in quotation marks. If the `csquotes` package is loaded, this command uses the language-sensitive quotation marks provided by that package. `\mkbibquote` also supports ‘American-style’ punctuation, see `\DeclareQuotePunctuation` in section 4.6.5 for details.

`\mkbibparens{<text>}`

A general purpose macro which wraps its argument in (user-definable) parentheses (see section 4.9.1) and prevents nested parentheses.

`\mkbibbrackets{<text>}`

A general purpose macro which wraps its argument in (user-definable) square brackets (see section 4.9.1) and prevents nested brackets.

`\mkbibfootnote{<text>}`

A general purpose macro which prints its argument as a footnote. This is a simple wrapper around the standard LaTeX `\footnote` command which removes spurious whitespace preceding the footnote mark, prevents nested footnotes, and automatically adds a period at the end of the note.

`\mkbibendnote{<text>}`

Similar in concept to `\mkbibfootnote` except that it uses the `\endnote` command provided by the `endnotes` package or some other package. It removes spurious whitespace preceding the endnote mark, prevents nested endnotes, and automatically adds a period at the end of the note. If there is no `\endnote` command, it will use `\footnote` instead.

`\mkbibsuperscript{<text>}`

A general purpose macro which prints its argument as superscripted text. This is a simple wrapper around the standard LaTeX `\textsuperscript` command which removes spurious whitespace and allows hyphenation of the preceding word.

`\mkbibmonth{<integer>}`

This command takes an integer argument and prints it as a month name. Even though the output of this command is language-specific, its definition is not, hence it is normally not redefined in localization modules.

`\bibdate` This command prints the date of the current entry, as specified by the fields `date` or `day/month/year`. The definition of this command is controlled by the

package option `date`. Depending on the setting of this option, it either points to `\bibdateshort` or `\bibdatelong` (see section 4.9.2).

`\biburldate` This command prints the URL date of the current entry, as specified by the fields `urldate` or `urlday/urlmonth/urlyear`. The definition of this command is controlled by the package option `urldate`. Depending on the setting of this option, it either points to `\biburldateshort` or `\biburldatelong` (see section 4.9.2).

`shorthandwidth` A special field formatting directive which is used internally by `biblatex`. When the bibliographic data is read from the `bbl` file, `biblatex` measures the values of all shorthand fields and sets the length register `\shorthandwidth` to the width of the widest shorthand (see section 4.9.5). In order to determine the correct width, the package considers two factors: the definition of `\bibfont` and this formatting directive. All styles should adjust this directive such that it corresponds to the format used in the `theshorthands` environment.

`labelnumberwidth` Similar to `shorthandwidth`, but referring to the `labelnumber` field and the length register `\labelnumberwidth`. Numeric styles should adjust this directive such that it corresponds to the format used in the `thebibliography` environment.

`labelalphawidth` Similar to `shorthandwidth`, but referring to the `labelalpha` field and the length register `\labelalphawidth`. Alphabetic styles should adjust this directive such that it corresponds to the format used in the `thebibliography` environment.

`bibhyperref` A special formatting directive for use with `\printfield` and `\printtext`. This directive wraps its argument in a `\bibhyperref` command, see section 4.5.4 for details.

`bibhyperlink` A special formatting directive for use with `\printfield` and `\printtext`. It wraps its argument in a `\bibhyperlink` command, see section 4.5.4 for details. The `<name>` argument passed to `\bibhyperlink` is the value of the `entrykey` field.

`bibhypertarget` A special formatting directive for use with `\printfield` and `\printtext`. It wraps its argument in a `\bibhypertarget` command, see section 4.5.4 for details. The `<name>` argument passed to `\bibhypertarget` is the value of the `entrykey` field.

4.9.5 Auxiliary lengths, counters, and other facilities

The length registers and counters discussed here are used by `biblatex` to pass information to bibliography and citation styles. Think of them as read-only registers. Note that all counters are LaTeX counters. Use `\value{counter}` to read out the current value.

`\shorthandwidth` This length register indicates the width of the widest shorthand. All bibliography styles using a `list` environment should incorporate this value in the definition of `theshorthands`.

`\labelnumberwidth` This length register indicates the width of the widest `labelnumber`. Numeric bibliography styles using a `list` environment should incorporate this value in the definition of `thebibliography`.

`\labelalphawidth` This length register indicates the width of the widest `labelalpha`. Alphabetic bib-

liography styles using a `list` environment should incorporate this value in the definition of `thebibliography`.

- `maxlabeleyear` This counter holds the highest number found in any `labeleyear` field.
- `maxextraalpha` This counter holds the highest number found in any `extraalpha` field.
- `refsection` This counter indicates the current `refsection` environment. When queried in a bibliography heading, the counter returns the value of the `refsection` option passed to `\printbibliography`.
- `refsegment` This counter indicates the current `refsegment` environment. When queried in a bibliography heading, this counter returns the value of the `refsegment` option passed to `\printbibliography`.
- `maxnames` This counter holds the setting of the `maxnames` package option.
- `minnames` This counter holds the setting of the `minnames` package option.
- `maxitems` This counter holds the setting of the `maxitems` package option.
- `minitems` This counter holds the setting of the `minitems` package option.
- `instcount` This counter is incremented by `biblatex` for every citation as well as for every entry in the bibliography and the list of shorthands. The value of this counter uniquely identifies a single instance of a reference in the document.
- `citetotal` This counter, which is only available in the `<loopcode>` of a citation command defined with `\DeclareCiteCommand`, holds the total number of valid entry keys passed to the citation command.
- `citecount` This counter, which is only available in the `<loopcode>` of a citation command defined with `\DeclareCiteCommand`, holds the number of the entry key currently being processed by the `<loopcode>`.
- `multicitetotal` This counter is similar to `citetotal` but only available in `multicite` commands. It holds the total number of citations passed to the `multicite` command. Note that each of these citations may consist of more than one entry key. This information is provided by the `citetotal` counter.
- `multicitecount` This counter is similar to `citecount` but only available in `multicite` commands. It holds the number of the citation currently being processed. Note that this citation may consist of more than one entry key. This information is provided by the `citetotal` and `citecount` counters.
- `listtotal` This counter holds the total number of items in the current list. It is intended for use in list formatting directives and does not hold a meaningful value when used anywhere else. As an exception, it may also be used in the second optional argument to `\printnames` and `\printlist`, see section 4.4.1 for details. For every list, there is also a counter by the same name which holds the total number of items in the corresponding list. For example, the `author` counter holds the total number of items in the author list. This applies to both name lists and literal lists. These counters are similar to `listtotal` except that they may also be used

independently of list formatting directives. For example, a bibliography style might check the editor counter to decide whether to print the term “editor” or rather its plural form “editors” after the list of editors.

- `listcount` This counter holds the number of the list item currently being processed. It is intended for use in list formatting directives and does not hold a meaningful value when used anywhere else.
- `liststart` This counter holds the $\langle start \rangle$ argument passed to `\printnames` or `\printlist`. It is intended for use in list formatting directives and does not hold a meaningful value when used anywhere else.
- `liststop` This counter holds the $\langle stop \rangle$ argument passed to `\printnames` or `\printlist`. It is intended for use in list formatting directives and does not hold a meaningful value when used anywhere else.
- `\currentfield` The name of the field currently being processed by `\printfield`. This information is only available locally in field formatting directives.
- `\currentlist` The name of the literal list currently being processed by `\printlist`. This information is only available locally in list formatting directives.
- `\currentname` The name of the name list currently being processed by `\printnames`. This information is only available locally in name formatting directives.

4.9.6 General purpose hooks

`\AtBeginBibliography`{ $\langle code \rangle$ }

Appends $\langle code \rangle$ to an internal hook executed at the beginning of the bibliography. The $\langle code \rangle$ will be executed at the beginning of the actual list of references, after the heading and a possible prenote, in the `thebibliography` environment. This command may only be used in the preamble.

`\AtBeginShorthands`{ $\langle code \rangle$ }

Appends $\langle code \rangle$ to an internal hook executed at the beginning of the list of shorthands. The $\langle code \rangle$ will be executed at the beginning of the actual list of shorthands, after the heading and a possible prenote, in the `theshorthands` environment. This command may only be used in the preamble.

`\AtEveryBibitem`{ $\langle code \rangle$ }

Appends $\langle code \rangle$ to an internal hook executed at the beginning of every item in the bibliography. The $\langle code \rangle$ will be executed right after `\thebibitem`. The bibliographic data of the respective entry is available at this point. This command may only be used in the preamble.

`\AtEveryLositem`{ $\langle code \rangle$ }

Appends $\langle code \rangle$ to an internal hook executed at the beginning of every item in the list of shorthands. The $\langle code \rangle$ will be executed right after `\thelositem`. The

bibliographic data of the respective entry is available at this point. This command may only be used in the preamble.

`\AtEveryCite{<code>}`

Appends `<code>` to an internal hook executed at the beginning of every citation command. The `<code>` will be executed immediately before the `<precode>` of the command (see section 4.3.1). No bibliographic data is available at this point. This command may only be used in the preamble.

`\AtEveryCitekey{<code>}`

Appends `<code>` to an internal hook executed once for every entry key passed to a citation command. The `<code>` will be executed immediately before the `<loopcode>` of the command (see section 4.3.1). The bibliographic data of the respective entry is available at this point. This command may only be used in the preamble.

`\AtNextCite{<code>}`

Similar to `\AtEveryCite` but only affecting the next citation command. The internal hook is cleared after being executed once. This command may be used in the document body.

`\AtNextCitekey{<code>}`

Similar to `\AtEveryCitekey` but only affecting the next entry key. The internal hook is cleared after being executed once. This command may be used in the document body.

`\AtDataInput[<type>]{<code>}`

Appends `<code>` to an internal hook executed once for every entry as the bibliographic data is imported from the bbl file. The `<type>` is the entry type the `<code>` applies to. If it applies to all entry types, omit the optional argument. The `<code>` will be executed immediately after the entry has been imported. This command may only be used in the preamble. Note that, if there are any refsection environments in the document and an entry is cited in more than one of them, the `<code>` may be executed multiple times for an entry. The refsection counter holds the number of the respective reference section while the data is imported.

4.10 Hints and caveats

This section provides some additional hints concerning the author interface of this package. It also addresses common problems and potential misconceptions.

4.10.1 Mixing programming interfaces

The biblatex package provides two main programming interfaces for style authors. The `\DeclareBibliographyDriver` command, which defines a handler for an entry type, is typically used in bbx files. `\DeclareCiteCommand`, which defines a new citation command, is typically used in cbx files. However, in some cases it is convenient to mix these two interfaces. For example, the `\fullcite` command

prints a verbose citation similar to the full bibliography entry. It is essentially defined as follows:

```
\DeclareCiteCommand{\fullcite}
  {...}
  {\usedriver{...}{\thefield{entrytype}}}
  {...}
  {...}
```

As you can see, the core code which prints the citations simply executes the bibliography driver defined with `\DeclareBibliographyDriver` for the type of the current entry. When writing a citation style for a verbose citation scheme, it is often convenient to use the following structure:

```
\ProvidesFile{example.cbx}[2007/06/09 v1.0 biblatex citation style]

\DeclareCiteCommand{\cite}
  {...}
  {\usedriver{...}{cite:\thefield{entrytype}}}
  {...}
  {...}

\DeclareBibliographyDriver{cite:article}{...}
\DeclareBibliographyDriver{cite:book}{...}
\DeclareBibliographyDriver{cite:inbook}{...}
...
```

Another case in which mixing interfaces is helpful are styles using cross-references within the bibliography. For example, when printing an `@incollection` entry, the data inherited from the `@collection` parent entry would be replaced by a short pointer to the respective parent entry:

- [1] Audrey Author: *Title of article*. In: [1], pp. 134–165.
- [2] Edward Editor, ed.: *Title of collection*. Publisher: Location, 1995.

One way to implement such cross-references within the bibliography is to think of them as citations which use the value of the `xref` or `crossref` field as the entry key. Here is an example:

```
\ProvidesFile{example.bbx}[2007/06/09 v1.0 biblatex bibliography style]

\DeclareCiteCommand{\bbx@xref}
  {}
  {...}% code for cross-references
  {}
  {}

\DeclareBibliographyDriver{incollection}{%
  ...
  \iffieldundef{xref}
  {...}% code if no cross-reference
```

```

    {\bbx@xref{\thefield{xref}}}%
    ...
}

```

When defining `\bbx@xref`, the `<precode>`, `<postcode>`, and `<sepcode>` arguments of `\DeclareCiteCommand` are left empty in the above example because they will not be used anyway. The cross-reference is printed by the `<loopcode>` of `\bbx@xref`. For further details on the `xref` field, refer to section 2.2.3 and to the hints in section 2.4.I. Also see the `\iffieldxref`, `\iflistxref`, and `\ifnamexref` tests in section 4.5.2. The above could also be implemented using the `\entrydata` command from section 4.4.I:

```

\ProvidesFile{example.bbx}[2007/06/09 v1.0 biblatex bibliography style]

\DeclareBibliographyDriver{incollection}{%
  ...
  \iffieldundef{xref}
    {...}% code if no cross-reference
    {\entrydata{\thefield{xref}}}%
    % code for cross-references
    ...
  }%
  ...
}

```

4.10.2 Reference sets

Reference sets have already been introduced in section 3.10.5. This section discusses how to process reference sets in a bibliography style. Handling them is surprisingly simple. You will normally use the `\entryset` command from section 4.4.I to loop over all set members (in the order in which they are listed in the `entryset` field of the `@set` entry) and append `\finentry` at the end. That's it. The formatting is handled by the drivers for the entry types of the individual set members:

```

\DeclareBibliographyDriver{set}{%
  \entryset{}{}%
  \finentry}

```

You may have noticed that the numeric styles which ship with this package support subdivided entry sets, i. e., the members of the set are marked with a letter or some other marker such that citations may either refer to the entire set or to a specific set member. The markers are generated as follows by the bibliography style:

```

\DeclareBibliographyDriver{set}{%
  \entryset
    {\printfield{entrysetcount}%
     \setunit*{\addnbspace}}
    {}%
  \finentry}

```

The `entrysetcount` field holds an integer indicating the position of a set member in the reference set. The conversion of this number to a letter or some other marker is handled by the formatting directive of the `entrysetcount` field. All the driver needs to do is print the field and add some white space (or start a new line). Printing the markers in citations works in a similar way. Where a numeric style normally says `\printfield{labelnumber}`, you simply append the `entrysetcount` field:

```
\printfield{labelnumber}\printfield{entrysetcount}
```

Since this field is only defined when processing citations referring to a set member, there is no need to add any additional tests.

4.10.3 Citation/page trackers in floats and TOC/LOT/LOF

If a citation is given in a float (typically in the caption of a figure or table), scholarly back references like ‘*ibidem*’ or back references based on the page tracker may get ambiguous because floats are objects which are (physically and logically) placed outside the flow of text, hence the logic of such back references applies poorly to them. To avoid any such ambiguities, the citation trackers are temporarily disabled in all floats. This is equivalent to setting `\citetrackerfalse` locally and affects all of the following from section 4.5.2: `\ifciteseen`, `\ifentryseen`, `\ifciteibid`, `\ifciteidem`, `\ifopcit`, and `\ifloccit`. The page tracker is disabled as well. This is equivalent to setting `\pagetrackerfalse` locally and affects the `\ifsamepage` and `\iffirstonpage` tests. The trackers are also disabled in the table of contents, the list of figures, and the list of tables for similar reasons.

4.10.4 Using the punctuation tracker (the right way)

The basics

There is one fundamental principle style authors should keep in mind when designing a bibliography driver: block and unit punctuation is handled asynchronously. This is best explained by way of example. Consider the following code snippet:

```
\printfield{title}%
\newunit
\printfield{edition}%
\newunit
\printfield{note}%
```

If there is no edition field, this piece of code will not print:

Title. . Note

but rather:

Title. Note

because the unit punctuation tracker works asynchronously. `\newunit` will not print the unit punctuation immediately. It merely records a unit boundary and puts `\newunitpunct` on the punctuation buffer. This buffer will be handled by *subsequent* `\printfield`, `\printlist`, or similar commands but only if the respective

field or list is defined. Commands like `\printfield` will consider three factors prior to inserting any block or unit punctuation:

- Has a new unit/block been requested at all?
 - = Is there any preceding `\newunit` or `\newblock` command?
- Did the preceding commands print anything?
 - = Is there any preceding `\printfield` or similar command?
 - = Did this command actually print anything?
- Are we about to print anything now?
 - = Is the field/list to be processed now defined?

Block and unit punctuation will only be inserted if *all* of these conditions apply. Let's reconsider the above example:

```
\printfield{title}%  
\newunit  
\printfield{edition}%  
\newunit  
\printfield{note}%
```

Here's what happens if the edition field is undefined. The first `\printfield` command prints the title and sets an internal 'new text' flag. The first `\newunit` sets an internal 'new unit' flag. No punctuation has been printed at this point. The second `\printfield` does nothing because the edition field is undefined. The next `\newunit` command sets the internal flag 'new unit' again. Still no punctuation has been printed. The third `\printfield` checks if the note field is defined. If so, it looks at the 'new text' and 'new unit' flags. If both are set, it inserts the punctuation buffer before printing the note. It then clears the 'new unit' flag and sets the 'new text' flag again.

This may all sound more complicated than it is. In practice, it means that is possible to write large parts of a bibliography driver in a sequential way. The advantage of this approach becomes obvious when trying to write the above code without using the punctuation tracker. Such an attempt will lead to a rather convoluted set of `\iffieldundef` tests required to check for all possible field combinations (note that the code below handles three fields; a typical driver may need to cater for some two dozen fields):

```
\iffieldundef{title}%  
  {\iffieldundef{edition}  
    {\printfield{note}}  
    {\printfield{edition}%  
      \iffieldundef{note}%  
      {}}  
    {.\printfield{note}}}}  
\printfield{title}%  
\iffieldundef{edition}  
{}  
{.\printfield{edition}}%  
\iffieldundef{note}
```

```

{}
{. \printfield{note}}}%

```

Common mistakes

It is a fairly common misconception to think of the unit punctuation as something that is handled synchronously. This typically causes problems if the driver includes any literal text. Consider this erroneous code snippet which will generate misplaced unit punctuation:

```

\printfield{title}%
\newunit
(\printfield{series} \printfield{number})%

```

This code will yield the following result:

```
Title (. Series Number)
```

Here's what happens. The first `\printfield` prints the title. Then `\newunit` marks a unit boundary but does not print anything. The unit punctuation is printed by the *next* `\printfield` command. That's the asynchronous part mentioned before. However, the opening parenthesis is printed immediately before the next `\printfield` inserts the unit punctuation, leading to a misplaced period. When inserting *any* literal text such as parentheses (including literal ones, `\bibleftparen`, `\mkbibparens`), always wrap the text in a `\printtext` command. For the punctuation tracker to work as expected, it needs to know about all literal text inserted by a driver. This is what `\printtext` is all about. `\printtext` interfaces with the punctuation tracker and ensures that the punctuation buffer is inserted before the literal text gets printed. It also sets the internal 'new text' flag. Note there is in fact a third piece of literal text in this example: the space after `\printfield{series}`. In the corrected example, we will use the punctuation tracker to handle that space.

```

\printfield{title}%
\newunit
\printtext{({}%
\printfield{series}%
\setunit*{\addspace}%
\printfield{number}%
\printtext{)})%

```

While the above code will work as expected, the recommended way to handle parentheses, quotes, and other things which enclose more than one field, is to define a field format:

```
\DeclareFieldFormat{parens}{\mkbibparens{#1}}
```

Field formats may be used with both `\printfield` and `\printtext`, hence we can use them to enclose several fields in a single pair of parentheses:

```

\printtext[parens]{%
  \printfield{series}%
  \setunit*{\addspace}%
  \printfield{number}%
}

```

```
}%
```

We still need to handle cases in which there is no series information at all, so let's improve the code some more:

```
\iffielddundef{series}
{
  {\printtext[parens]{%
    \printfield{series}%
    \setunit*{\addspace}%
    \printfield{number}}}%
}
```

One final hint: bibliography strings are not literal text as far as the punctuation tracker is concerned. Since `\bibstring` and similar commands interface with the punctuation tracker, there is no need to wrap them in a `\printtext` command.

Advanced usage

The punctuation tracker may also be used to handle more complex scenarios. For example, suppose that we want the fields `location`, `publisher`, and `year` to be rendered in one of the following formats, depending on the available data:

```
...text. Location: Publisher, Year. Text...
...text. Location: Publisher. Text...
...text. Location: Year. Text...
...text. Publisher, Year. Text...
...text. Location. Text...
...text. Publisher. Text...
...text. Year. Text...
```

This problem can be solved with a rather convoluted set of `\iflistundef` and `\iffielddundef` tests which check for all possible field combinations:

```
\iflistundef{location}
{
  {\iflistundef{publisher}
    {\printfield{year}}
    {\printlist{publisher}%
     \iffielddundef{year}
     {}
     {, \printfield{year}}}}
  {\printlist{location}%
   \iflistundef{publisher}%
   {\iffielddundef{year}
    {}
    {: \printfield{year}}}
   {: \printlist{publisher}%
    \iffielddundef{year}
    {}
    {, \printfield{year}}}}%
}
```

The above could be written in a somewhat more readable way by employing `\ifthenelse` and the boolean operators discussed in section 4.5.3. The approach would still be essentially the same. However, it may also be written sequentially:

```

\newunit
\printlist{location}%
\setunit*{\addcolon\space}%
\printlist{publisher}%
\setunit*{\addcomma\space}%
\printfield{year}%
\newunit

```

In practice, you will often use a combination of explicit tests and the implicit tests performed by the punctuation tracker. For example, the standard styles which ship with this package use the following format (note the punctuation after the location if there is no publisher):

```

...text. Location: Publisher, Year. Text...
...text. Location: Publisher. Text...
...text. Location Year. Text...
...text. Publisher, Year. Text...
...text. Location. Text...
...text. Publisher. Text...
...text. Year. Text...

```

This is handled by the following code:

```

\newunit
\printlist{location}%
\iflistundef{publisher}
  {\setunit*{\addspace}}
  {\setunit*{\addcolon\space}}%
\printlist{publisher}%
\setunit*{\addcomma\space}%
\printfield{year}%
\newunit

```

Since the punctuation after the location is special if there is no publisher, we need one `\iflistundef` test to catch this case. Everything else is handled by the punctuation tracker.

4.10.5 Electronic publishing information

The standard styles feature dedicated support for arXiv references. Support for other resources is easily added. The standard styles handle the `eprint` field as follows:

```

\iffieldundef{eprinttype}
  {\printfield{eprint}}
  {\printfield[eprint:\strfield{eprinttype}]{eprint}}

```

If an `eprinttype` field is available, the above code tries to use the field format `eprint:⟨eprinttype⟩`. If this format is undefined, `\printfield` automatically falls back to the field format `eprint`. There are two predefined field formats, the type-specific format `eprint:arxiv` and the fallback format `eprint`:

```

\DeclareFieldFormat{eprint}{...}
\DeclareFieldFormat{eprint:arxiv}{...}

```

In other words, adding support for additional resources is as easy as defining a field format named `eprint:`*<resource>* where *<resource>* is an identifier to be used in the `eprinttype` field.

4.10.6 External abstracts and annotations

External abstracts and annotations have been discussed in section 3.10.7. This section provides some more background for style authors. The standard styles use the following macros (from `biblatex.def`) to handle abstracts and annotations:

```
\newbibmacro*{annotation}{%
  \iffieldundef{annotation}
    {\printfile[annotation]{\bibannotationprefix\thefield{entrykey}.tex}}%
    {\printfield{annotation}}
\newcommand*{\bibannotationprefix}{bibannotation-}

\newbibmacro*{abstract}{%
  \iffieldundef{abstract}
    {\printfile[abstract]{\bibabstractprefix\thefield{entrykey}.tex}}%
    {\printfield{abstract}}
\newcommand*{\bibabstractprefix}{bibabstract-}
```

If the `abstract/annotation` field is undefined, the above code tries to load the abstracts/annotations from an external file. The `\printfile` commands also incorporate file name prefixes which may be redefined by users. Note that you must enable `\printfile` explicitly by setting the `loadfiles` package option from section 3.1.2. This feature is disabled by default for performance reasons.

4.10.7 Custom localization modules

Style guides may include provisions as to how strings like ‘edition’ should be abbreviated or they may mandate certain fixed expressions. For example, the MLA style guide requires authors to use the term ‘Works Cited’ rather than ‘Bibliography’ or ‘References’ in the heading of the bibliography. Localization commands such as `\DefineBibliographyStrings` from section 3.7 may indeed be used in `cbx` and `bbx` files to handle such cases. However, overloading style files with translations is rather inconvenient. This is where `\DeclareLanguageMapping` from section 4.8.1 comes into play. This command maps an `lbx` file with alternative translations to a `babel` language. For example, you could create a file named `french-humanities.lbx` which provides French translations adapted for use in the humanities and map it to the `babel` language `french` in the preamble or in the configuration file:

```
\DeclareLanguageMapping{french}{french-humanities}
```

If the document language is set to `french`, `french-humanities.lbx` will replace `french.lbx`. Coming back to the MLA example mentioned above, an MLA style may come with an `american-mla.lbx` file to provide strings which comply with the MLA style guide. It would declare the following mapping in the `cbx` and/or `bbx` file:

```
\DeclareLanguageMapping{american}{american-mla}
```

Since the alternative lbx file can inherit strings from the standard `american.lbx` module, `american-mla.lbx` may be as short as this:

```
\ProvidesFile{american-mla.lbx}[2008/10/01 v1.0 biblatex localization]
\InheritBibliographyExtras{american}
\DeclareBibliographyStrings{%
  inherit      = {american},
  bibliography = {{Works Cited}{Works Cited}},
  references   = {{Works Cited}{Works Cited}},
}
\endinput
```

Alternative lbx files must ensure that the localization module is complete. They will typically do so by inheriting data from the corresponding standard module. If the language `american` is mapped to `american-mla.lbx`, `biblatex` will not load `american.lbx` unless this module is requested explicitly. In the above example, inheriting ‘strings’ and ‘extras’ will cause `biblatex` to load `american.lbx` before applying the modifications in `american-mla.lbx`.

Note that `\DeclareLanguageMapping` is not intended to handle language variants (e. g., American English vs. British English) or `babel` language aliases (e. g., `USenglish` vs. `american`). For example, `babel` offers the `USenglish` option which is similar to `american`. Therefore, `biblatex` ships with an `USenglish.lbx` file which simply inherits all data from `american.lbx` (which in turn gets the ‘strings’ from `english.lbx`). In other words, the mapping of language variants and `babel` language aliases happens on the file level, the point being that `biblatex`’s language support can be extended simply by adding additional lbx files. There is no need for centralized mapping. If you need support for, say, Portuguese (`babel:portuges`), you create a file named `portuges.lbx`. If `babel` offered an alias named `brasil`, you would create `brasil.lbx` and inherit the data from `portuges.lbx`. In contrast to that, the point of `\DeclareLanguageMapping` is handling *stylistic* variants like ‘humanities vs. natural sciences’ or ‘MLA vs. APA’ etc. which will typically be built on top of existing lbx files.

4.10.8 Grouping

When developing a citation or bibliography style, you may need to set switches or store certain values for later use. In this case, it is crucial to understand the basic grouping structure imposed by this package. As a rule of thumb, you are working in a large group whenever author commands such as those discussed in section 4.5 are available because the author interface of this package is only enabled locally. If any bibliographic data is available, there is at least one additional group. Here are some general rules:

- The entire list of references printed by `\printbibliography` and similar commands is processed in a group. Each entry in the list is processed in an additional group which encloses `\thebibitem` as well as all driver code.
- The entire list of shorthands printed by `\printshorthands` is processed in a

group. Each entry in the list is processed in an additional group which encloses `\thelostitem` as well as all driver code.

- All citation commands defined with `\DeclareCiteCommand` are processed in a group holding the complete citation code consisting of the `\precode`, `\sepcode`, `\loopcode`, and `\postcode` arguments. The `\loopcode` is enclosed in an additional group every time it is executed. If any `\wrapper` code has been specified, the entire unit consisting of the wrapper code and the citation code is wrapped in an additional group.
- In addition to the grouping imposed by all backend commands defined with `\DeclareCiteCommand`, all ‘autocite’ and ‘multicite’ definitions imply an additional group.
- `\printfile`, `\printtext`, `\printfield`, `\printlist`, and `\printnames` form groups. This implies that all formatting directives will be processed within a group of their own.
- All `lbx` files are loaded and processed in a group. If an `lbx` file contains any code which is not part of `\DeclareBibliographyExtras`, the definitions must be global.

Note that using `\aftergroup` in citation and bibliography styles is unreliable because the precise number of groups employed in a certain context may change in future versions of this package. If the above list states that something is processed in a group, this means that there is *at least one* group. There may also be several nested ones.

4.10.9 Namespaces

In order to reduce the risk of name clashes, LaTeX packages typically prefix the names of internal macros with a short string specific to the package. For example, if the `foobar` package requires a macro for internal use, it would typically be called `\FB@macro` or `\foo@macro` rather than `\macro` or `@macro`. Here is a list of the prefixes used or recommended by `biblatex`:

- `blx@` All macros with names like `\blx@name` are strictly reserved for internal use. This also applies to counter names, length registers, boolean switches, and so on. These macros may be altered in backwards-incompatible ways, they may be renamed or even removed at any time without further notice. Such changes will not even be mentioned in the revision history or the release notes. In short: never use any macros with the string `blx@` in their name in any styles.
- `abx@` Macros prefixed with `abx@` are also internal macros but they are fairly stable. It is always preferable to use the facilities provided by the official author interface in styles but there may be cases in which using an `abx@` macro is convenient.
- `bbx@` This is the recommended prefix for internal macros defined in bibliography styles.
- `cbx@` This is the recommended prefix for internal macros defined in citation styles.
- `lbx@` This is the recommended base prefix for internal macros defined in localization

modules. The localization module should add a second prefix to specify the language. For example, an internal macro defined by the Spanish localization module would be named `\lbx@es@macro`.

5 Revision history

This revision history is a list of changes relevant to users of this package. Changes of a more technical nature which do not affect the user interface or the behavior of the package are not included in the list. If an entry in the revision history states that a feature has been *improved* or *extended*, this indicates a modification which either does not affect the syntax and behavior of the package or is syntactically backwards compatible (such as the addition of an optional argument to an existing command). Entries stating that a feature has been *modified*, *renamed*, or *removed* demand attention. They indicate a modification which may require changes to existing styles or documents in some, hopefully rare, cases. The numbers on the right indicate the relevant section of this manual.

0.8e 2009-07-04

Added <code>\mkbibordedition</code>	3.8.2
Added <code>\mkbibordseries</code>	3.8.2
Added <code>\mkbibendnote</code>	4.9.4
Added several localization keys related to <code>editor</code>	4.8.2
Added several localization keys related to <code>translator</code>	4.8.2
Added localization key <code>thiscite</code>	4.8.2
Removed several <code>country</code> . . . localization keys	4.8.2
Removed several <code>patent</code> . . . localization keys	4.8.2
Removed several <code>patreq</code> . . . localization keys	4.8.2
Updated and clarified documentation	4.8.2
Added support for Brazilian Portuguese (by Augusto Ritter Stoffel)	2.2.3
Added preliminary support for Portuguese/Portugal	2.2.3
Added revised Swedish translations (by Per Starbäck)	2.2.3
Expanded documentation	4.10.9
Improved concatenation of editorial and other roles	
Fixed some bugs	

0.8d 2009-05-30

Removed package option <code>bibtex8</code>	3.1.3
Added package option <code>backend</code>	3.1.3
Slightly modified package option <code>loccittracker</code>	3.1.5
Added <code>\volcite</code> and <code>\Volcite</code>	3.6.6
Added <code>\pvolcite</code> and <code>\Pvolcite</code>	3.6.6
Added <code>\fvolcite</code> and <code>\Fvolcite</code>	3.6.6
Added <code>\tvolcite</code> and <code>\Tvolcite</code>	3.6.6
Added <code>\avolcite</code> and <code>\Avolcite</code>	3.6.6
Added <code>\notecite</code> and <code>\Notecite</code>	3.6.6
Added <code>\Pnotecite</code> and <code>\Pnotecite</code>	3.6.6

Added \fnotecite and \Fnotecite	3.6.6
Added \addabthinspace	4.6.4
Disable citation and page trackers in TOC/LOT/LOF	4.10.3
Disable citation and page trackers in floats	4.10.3
Improved on-demand loading of localization modules	
Fixed some bugs	
0.8c 2009-01-10	
Added ‘idem’ tracker	3.I.5
Added package option idemtracker	3.I.5
Added \ifciteidem	4.5.2
Added \ifentryseen	4.5.2
Improved citation style verbose-trad1	3.3.I
Improved citation style verbose-trad2	3.3.I
Renamed \bibitemextrasep to \bibnamesep	3.8.3
Slightly modified \bibnamesep	3.8.3
Added \bibinitsep	3.8.3
Increased default value of highnamepenalty	3.8.3
Increased default value of lownamepenalty	3.8.3
Updated documentation	3.9.I
Added \uspunctuation	4.6.5
Added \stdpunctuation	4.6.5
Added \midsentence*	4.6.6
Fixed some bugs	
0.8b 2008-12-13	
Added package/entry option usetranslator	3.I.4
Added \ifusetranslator	4.5.2
Consider translator when sorting	3.4
Consider translator when generating labelname	4.2.4
Added field eventtitle	2.2.2
Support eventtitle in @proceedings entries	2.I.I
Support eventtitle in @inproceedings entries	2.I.I
Added unsupported entry type @commentary	2.I.3
Permit \NewBibliographyString in lbx files	4.8.I
Improved behavior of \mkbibquote in ‘American-punctuation’ mode	4.9.4
Fixed some bugs	
0.8a 2008-11-29	
Updated documentation (important, please read)	1.3
Added package option hyperref=auto	3.I.2
Improved bibliography style reading	3.3.2
Updated KOMA-Script support for version 3.x	3.II.I
Slightly modified special field fullhash	4.2.4
Added documentation of \DeclareNumChars*	4.5.4
Added documentation of \DeclareRangeChars*	4.5.4

Added documentation of <code>\DeclareRangeCommands*</code>	4.5.4
Added <code>\MakeSentenceCase</code>	4.5.4
Added <code>\DeclareCaseLangs</code>	4.5.4
Support nested <code>\mkbibquote</code> with American punctuation	4.9.4
Improved <code>\ifpunctmark</code>	4.6.2
Improved punctuation tracker	4.6.3
Added <code>\DeclarePunctuationPairs</code>	4.6.5
Added <code>\DeclareLanguageMapping</code>	4.8.1
Added support for custom localization modules	4.10.7
Added extended PDF bookmarks to this manual	
Fixed various bugs	

0.8 2008-10-02

Added <code>\DefineHyphenationExceptions</code>	3.7
Added <code>\DeclareHyphenationExceptions</code>	4.8.1
Added <code>\mkpagetotal</code>	4.5.4
Improved KOMA-Script support	3.II.1
Added <code>\ifkomabibtoc</code>	3.II.1
Added <code>\ifkomabibtocnumbered</code>	3.II.1
Added <code>\ifmemoirbibintoc</code>	3.II.2
Updated documentation	3.5.6
Updated documentation of <code>\iffootnote</code>	4.5.2
Added several new localization keys	4.8.2
Rearranged some localization keys (section vs. paragraph)	4.8.2
Added unsupported entry type <code>@letter</code>	2.I.3
Added entry type <code>@suppbook</code> (supported as alias only)	2.I.3
Added entry type <code>@suppcollection</code> (supported as alias only)	2.I.3
Added entry type <code>@suppperiodical</code> (supported as alias only)	2.I.3
Support <code>@reference</code> and <code>@inreference</code> as aliases	2.I.3
Support <code>@review</code> as an alias	2.I.3
Added field <code>origpublisher</code>	2.2.2
Added field alias <code>annote</code>	2.2.5
Expanded documentation	2.4.3
Added <code>\DeclareCapitalPunctuation</code>	4.6.5
Removed <code>\EnableCapitalAfter</code> and <code>\DisableCapitalAfter</code>	4.6.5
Added support for ‘American-style’ punctuation	4.6.5
Added <code>\DeclareQuotePunctuation</code>	4.6.5
Improved <code>\mkbibquote</code>	4.9.4
Expanded documentation	3.9.1
Improved all numeric citation styles	3.3.1
Improved numeric bibliography style	3.3.2
Added citation style <code>authoryear-ibid</code>	3.3.1
Improved all <code>authoryear</code> citation styles	3.3.1
Improved <code>authoryear</code> bibliography style	3.3.2
Added <code>pageref</code> option to <code>verbose-note</code> style	3.3.1
Added <code>pageref</code> option to <code>verbose-inote</code> style	3.3.1

Added citation style reading	3.3.1
Added bibliography style reading	3.3.2
Added citation style draft	3.3.1
Added bibliography style draft	3.3.2
Improved natbib compatibility style	3.6.9
Added <code>\ifcitation</code>	4.5.2
Added <code>\ifbibliography</code>	4.5.2
Added <code>\printfile</code>	4.4.1
Added package option <code>loadfiles</code>	3.1.2
Added support for bibliographic data in external files	3.10.7
Expanded documentation	4.10.6
Modified field edition	2.2.2
Modified special field <code>labelyear</code>	4.2.4
Modified special field <code>labelalpha</code>	4.2.4
Added special field <code>extraalpha</code>	4.2.4
Added counter <code>maxlabelyear</code>	4.9.5
Added counter <code>maxextraalpha</code>	4.9.5
Added <code>\mknumalph</code>	3.8.4
Added <code>\mkbibacro</code>	3.8.4
Added <code>\autocap</code>	3.8.4
Added package option <code>firstinits</code>	3.1.2
Added <code>\iffirstinits</code>	4.5.2
Added support for eprint data	3.10.6
Added support for arXiv	3.10.6
Expanded documentation	4.10.5
Added field <code>eprint</code>	2.2.2
Added field <code>eprinttype</code>	2.2.2
Added eprint support to all standard entry types	2.1.1
Added package option <code>arxiv</code>	3.1.2
Introduced concept of a reference set	3.10.5
Expanded documentation	4.10.2
Added entry type <code>@set</code>	2.1.1
Added field <code>entryset</code>	2.2.3
Added special field <code>entrysetcount</code>	4.2.4
Added <code>\entrydata</code>	4.4.1
Expanded documentation	4.10.1
Added <code>\entryset</code>	4.4.1
Added <code>\strfield</code>	4.5.1
Improved <code>\usedriver</code>	4.5.4
Added <code>\bibpagespunct</code>	3.8.1
Expanded documentation	4.10.4
Added entry option <code>skipbib</code>	3.1.4
Added entry option <code>skiplos</code>	3.1.4
Added entry option <code>skiplab</code>	3.1.4
Added entry option <code>dataonly</code>	3.1.4
Modified special field <code>namehash</code>	4.2.4

Added special field fullhash	4.2.4
Added \DeclareNumChars	4.5.4
Added \DeclareRangeChars	4.5.4
Added \DeclareRangeCommands	4.5.4
Added support for Swedish (translations by Per Starbäck and others)	2.2.3
Updated various localization files	
Various minor improvements throughout	
Fixed some bugs	

0.7 2007-12-09

Expanded documentation	1.3
New dependency on etoolbox package	1.6.I
Made url a required package	1.6.I
Modified package option sorting	3.I.2
Introduced concept of an entry option	3.I.4
Added option useauthor	3.I.4
Added option useeditor	3.I.4
Modified option useprefix	3.I.4
Removed field useprefix	2.2.3
Added field options	2.2.3
Updated documentation	3.4
Added citation style authortitle-ibid	3.3.I
Added citation style authortitle-icompe	3.3.I
Renamed citation style authortitle-cterse to authortitle-tcomp	3.3.I
Renamed citation style authortitle-verb to verbose	3.3.I
Renamed citation style authortitle-cverb to verbose-ibid	3.3.I
Added citation style verbose-note	3.3.I
Added citation style verbose-inote	3.3.I
Renamed citation style authortitle-trad to verbose-trad1	3.3.I
Removed citation style authortitle-strad	3.3.I
Added citation style verbose-trad2	3.3.I
Improved citation style authoryear	3.3.I
Improved citation style authoryear-comp	3.3.I
Improved citation style authortitle-terse	3.3.I
Improved citation style authortitle-tcomp	3.3.I
Improved all verbose citation styles	3.3.I
Expanded documentation	2.2.I
Modified entry type @article	2.I.I
Added entry type @periodical	2.I.I
Added entry type @patent	2.I.I
Extended entry types proceedings and inproceedings	2.I.I
Extended entry type article	2.I.I
Extended entry type booklet	2.I.I
Extended entry type misc	2.I.I
Added entry type alias @electronic	2.I.2
Added new custom types	2.I.3

Support pagetotal field where applicable	2.I.I
Added field holder	2.2.2
Added field venue	2.2.2
Added field version	2.2.2
Added field journaltitle	2.2.2
Added field journalsubtitle	2.2.2
Added field issuetitle	2.2.2
Added field issuesubtitle	2.2.2
Removed field journal	2.2.2
Added field alias journal	2.2.5
Added field shortjournal	2.2.2
Added field shortseries	2.2.2
Added field shorthandintro	2.2.2
Added field xref	2.2.3
Added field authortype	2.2.2
Added field editortype	2.2.2
Added field reprinttitle	2.2.2
Improved handling of field type	2.2.2
Improved handling of field series	2.2.2
Updated documentation	2.3.6
Renamed field id to eid	2.2.2
Added field pagination	2.2.2
Added field bookpagination	2.2.2
Added special field sortinit	4.2.4
Introduced concept of a multicite command	3.6.3
Added \cites	3.6.3
Added \Cites	3.6.3
Added \parencites	3.6.3
Added \Parencites	3.6.3
Added \footcites	3.6.3
Added \Footcites	3.6.3
Added \supercites	3.6.3
Added \Autocite	3.6.4
Added \autocites	3.6.4
Added \Autocites	3.6.4
Added \DeclareMultiCiteCommand	4.3.1
Added counter multicitecount	4.9.5
Added counter multicitetotal	4.9.5
Renamed \citefulltitle to \citetitle*	3.6.5
Added \cite*	3.6.2
Added \citeurl	3.6.5
Added documentation of field nameaddon	2.2.2
Added field entrysubtype	2.2.3
Added field execute	2.2.3
Added custom fields verb[a-c]	2.2.4
Added custom fields name[a-c]type	2.2.4

Consider sorttitle field when falling back to title	3.4
Removed package option labelctitle	3.I.5
Removed field labelctitle	4.2.4
Added package option singletitle	3.I.5
Added \ifsingletitle	4.5.2
Added \ifuseauthor	4.5.2
Added \ifuseeditor	4.5.2
Added \ifopcit	4.5.2
Added \ifloccit	4.5.2
Added package option uniquename	3.I.5
Added special counter uniquename	4.5.2
Added package option natbib	3.I.1
Added compatibility commands for the natbib package	3.6.9
Added package option defernums	3.I.2
Improved support for numeric labels	3.II.4
Added package option mincrossrefs	3.I.3
Added package option bibencoding	3.I.3
Expanded documentation	2.4.3
Updated documentation	2.4.4
Added package option citetracker	3.I.5
Added package option ibidtracker	3.I.5
Added package option opcitracker	3.I.5
Added package option loccitracker	3.I.5
Added \citetrackertrue and \citetrackerfalse	4.5.4
Modified package option pagetracker	3.I.5
Added \pagetrackertrue and \pagetrackerfalse	4.5.4
Text commands now exluded from tracking	3.6.5
Updated documentation of \iffirstonpage	4.5.2
Updated documentation of \ifsamepage	4.5.2
Removed package option keywsort	3.I.2
Added package option refsection	3.I.2
Added package option refsegment	3.I.2
Added package option citereset	3.I.2
Added option section to \bibbysegment	3.5.I
Added option section to \bibbycategory	3.5.I
Added option section to \printshorthands	3.5.2
Extended documentation of refsection environment	3.5.3
Added \newrefsection	3.5.3
Added \newrefsegment	3.5.4
Added heading definition subbibliography	3.5.6
Added heading definition subbibintoc	3.5.6
Added heading definition subbibnumbered	3.5.6
Make all citation commands scan ahead for punctuation	3.6
Updated documentation of \DeclareAutoPunctuation	4.6.5
Removed \usecitecmd	4.3.I
Updated documentation of autocite package option	3.I.2

Updated documentation of autopunct package option	3.I.2
Added \citereset	3.6.8
Added \citereset*	3.6.8
Added \mancite	3.6.8
Added \citesetup	3.8.I
Added \compcitedelim	3.8.I
Added \labelnamepunct	3.8.I
Added \subtitlepunct	3.8.I
Added \finallistdelim	3.8.I
Added \andmoredelim	3.8.I
Added \labelalphaothers	3.8.I
Added \bibitemextrasep	3.8.3
Renamed \blxauxprefix to \blxauxsuffix	3.IO.2
Added \DeclareBibliographyOption	4.2.I
Added \DeclareEntryOption	4.2.I
Renamed \InitializeBibliographyDrivers to \InitializeBibliographyStyle	4.2.I
Added \InitializeCitationStyle	4.3.I
Added \OnManualCitation	4.3.I
Extended documentation of \DeclareCiteCommand	4.3.I
Modified \DeclareAutoCiteCommand	4.3.I
Improved \printtext	4.4.I
Improved \printfield	4.4.I
Improved \printlist	4.4.I
Improved \printnames	4.4.I
Improved \indexfield	4.4.I
Improved \indexlist	4.4.I
Improved \indexnames	4.4.I
Modified \DeclareFieldFormat	4.4.2
Modified \DeclareListFormat	4.4.2
Modified \DeclareNameFormat	4.4.2
Modified \DeclareFieldAlias	4.4.2
Modified \DeclareListAlias	4.4.2
Modified \DeclareNameAlias	4.4.2
Modified \DeclareIndexFieldFormat	4.4.2
Modified \DeclareIndexListFormat	4.4.2
Modified \DeclareIndexNameFormat	4.4.2
Modified \DeclareIndexFieldAlias	4.4.2
Modified \DeclareIndexListAlias	4.4.2
Modified \DeclareIndexNameAlias	4.4.2
Improved \iffirstonpage	4.5.2
Improved \ifciteseen	4.5.2
Improved \ifandothers	4.5.2
Added \ifinteger	4.5.2
Added \ifnumeral	4.5.2
Added \ifnumerals	4.5.2

Removed \ifpage	4.5.2
Removed \ifpages	4.5.2
Moved \ifblank to etoolbox package	4.5.2
Removed \xifblank	4.5.2
Moved \docsvlist to etoolbox package	4.5.4
Updated documentation of \docsvfield	4.5.4
Added \ifciteibid	4.5.2
Added \iffootnote	4.5.2
Added \iffieldxref	4.5.2
Added \iflistxref	4.5.2
Added \ifnamexref	4.5.2
Added \ifmoreitems	4.5.2
Added \ifbibstring	4.5.2
Added \iffieldbibstring	4.5.2
Added \mkpageprefix	4.5.4
Added \NumCheckSetup	4.5.4
Added \pno	3.6.8
Added \ppno	3.6.8
Added \nopp	3.6.8
Added \ppspace	4.5.4
Added \psq	3.6.8
Added \psqq	3.6.8
Added \sqspace	4.5.4
Expanded documentation	2.3.9
Expanded documentation	3.II.3
Added \RN	3.6.8
Added \Rn	3.6.8
Added \RNfont	3.6.8
Added \Rnfont	3.6.8
Added package option punctfont	3.I.2
Added \setpunctfont	4.6.I
Added \resetpunctfont	4.6.I
Added \nopunct	4.6.3
Added \bibxstring	4.7
Added \mkbibemph	4.9.4
Added \mkbibquote	4.9.4
Added \mkbibfootnote	4.9.4
Added \mkbibsupserscript	4.9.4
Added \currentfield	4.9.5
Added \currentlist	4.9.5
Added \currentname	4.9.5
Added \AtNextCite	4.9.6
Added \AtNextCitekey	4.9.6
Added \AtDataInput	4.9.6
Added several new localization keys	4.8.2
Added support for Norwegian (translations by Johannes Wilm)	2.2.3

Added support for Danish (translations by Johannes Wilm)	2.2.3
Expanded documentation	4.10.8
Expanded documentation	4.10.1
Numerous improvements under the hood	
Fixed some bugs	

0.6 2007-01-06

Added package option <code>sorting=none</code>	3.1.2
Renamed package option <code>block=penalty</code> to <code>block=ragged</code>	3.1.2
Changed data type of <code>origlanguage</code> back to field	2.2.2
Support <code>origlanguage</code> field if translator is present	2.1.1
Renamed field <code>articleid</code> to <code>id</code>	2.2.2
Support <code>id</code> field in article entries	2.1.1
Support <code>series</code> field in article entries	2.1.1
Support <code>doi</code> field	2.1.1
Updated documentation of all entry types	2.1.1
Updated documentation of field <code>series</code>	2.2.2
Added field <code>redactor</code>	2.2.2
Added field <code>shortauthor</code>	2.2.2
Added field <code>shorteditor</code>	2.2.2
Improved support for corporate authors and editors	2.3.3
Updated documentation of field <code>labelname</code>	4.2.4
Added field <code>alias key</code>	2.2.5
Added package option <code>autocite</code>	3.1.2
Added package option <code>autopunct</code>	3.1.2
Added <code>\autocite</code>	3.6.4
Added <code>\DeclareAutoCiteCommand</code>	4.3.1
Added <code>\DeclareAutoPunctuation</code>	4.6.5
Added option <code>filter</code> to <code>\printbibliography</code>	3.5.1
Added <code>\defbibfilter</code>	3.5.8
Added package option <code>maxitems</code>	3.1.2
Added package option <code>minitems</code>	3.1.2
Added option <code>maxitems</code> to <code>\printbibliography</code>	3.5.1
Added option <code>minitems</code> to <code>\printbibliography</code>	3.5.1
Added option <code>maxitems</code> to <code>\bibbysection</code>	3.5.1
Added option <code>minitems</code> to <code>\bibbysection</code>	3.5.1
Added option <code>maxitems</code> to <code>\bibbysegment</code>	3.5.1
Added option <code>minitems</code> to <code>\bibbysegment</code>	3.5.1
Added option <code>maxitems</code> to <code>\bibbycategory</code>	3.5.1
Added option <code>minitems</code> to <code>\bibbycategory</code>	3.5.1
Added option <code>maxitems</code> to <code>\printshorthands</code>	3.5.2
Added option <code>minitems</code> to <code>\printshorthands</code>	3.5.2
Added counter <code>maxitems</code>	4.9.5
Added counter <code>minitems</code>	4.9.5
Added adapted headings for <code>scrartcl</code> , <code>scrbook</code> , <code>scrreprt</code>	1.6.3
Added adapted headings for <code>memoir</code>	1.6.3

Added \Cite	3.6.I
Added \Parencite	3.6.I
Added \Footcite	3.6.I
Added \Textcite	3.6.2
Added \parencite*	3.6.2
Added \supercite	3.6.2
Added \Citeauthor	3.6.5
Added \nameyear delim	3.8.I
Added \multilistdelim	3.8.I
Completed documentation	3.8.I
Completed documentation	4.9.I
Added \usecitecmd	4.3.I
Added \hyphenate	3.8.4
Added \hyphen	3.8.4
Added \nbhyphen	3.8.4
Improved \ifsamepage	4.5.2
Removed \ifnameequalstr	4.5.2
Removed \iflistequalstr	4.5.2
Added \ifcapital	4.5.2
Added documentation of \MakeCapital	4.5.4
Added starred variant to \setunit	4.6.I
Improved \ifterm	4.6.2
Straightened out documentation of \thelist	4.5.I
Straightened out documentation of \thename	4.5.I
Added \docsvfield	4.5.4
Added \docsvlist	4.5.4
Removed \CopyFieldFormat	4.4.2
Removed \CopyIndexFieldFormat	4.4.2
Removed \CopyListFormat	4.4.2
Removed \CopyIndexListFormat	4.4.2
Removed \CopyNameFormat	4.4.2
Removed \CopyIndexNameFormat	4.4.2
Added \savefieldformat	4.5.4
Added \restorefieldformat	4.5.4
Added \savelistformat	4.5.4
Added \restorelistformat	4.5.4
Added \savenameformat	4.5.4
Added \restorenameformat	4.5.4
Added \savebibmacro	4.5.4
Added \restorebibmacro	4.5.4
Added \savecommand	4.5.4
Added \restorecommand	4.5.4
Added documentation of shorthands driver	4.2.I
Rearranged, renamed, and extended localization keys	4.8.2
Renamed counter citecount to instcount	4.9.5
Added new counter citecount	4.9.5

Added counter <code>citetotal</code>	4.9.5
Rearranged and expanded documentation	2.3
Expanded documentation	2.4
Expanded documentation	3.II.1
Expanded documentation	3.II.2
Completed support for Spanish	3.9.2
Added support for Italian (translations by Enrico Gregorio)	2.2.3
Added language alias <code>australian</code>	2.2.3
Added language alias <code>newzealand</code>	2.2.3
Various minor improvements throughout	

0.5 2006-11-12

Added <code>\usedriver</code>	4.5.4
Added package option <code>pagetracker</code>	3.I.2
Added <code>\iffirstonpage</code>	4.5.2
Added <code>\ifsamepage</code>	4.5.2
Corrected documentation of <code>\ifciteseen</code>	4.5.2
Added package option <code>terseinits</code>	3.I.2
Modified default value of package option <code>maxnames</code>	3.I.2
Renamed package option <code>index</code> to <code>indexing</code>	3.I.2
Extended package option <code>indexing</code>	3.I.2
Removed package option <code>citeindex</code>	3.I.2
Removed package option <code>bibindex</code>	3.I.2
Added package option <code>labelalpha</code>	3.I.5
Updated documentation of field <code>labelalpha</code>	4.2.4
Added package option <code>labelctitle</code>	3.I.5
Updated documentation of field <code>labelctitle</code>	4.2.4
Added package option <code>labelnumber</code>	3.I.5
Updated documentation of field <code>labelnumber</code>	4.2.4
Added package option <code>labelyear</code>	3.I.5
Updated documentation of field <code>labelyear</code>	4.2.4
Added citation style <code>authortitle-verb</code>	3.3.I
Added citation style <code>authortitle-cverb</code>	3.3.I
Renamed citation style <code>traditional</code> to <code>authortitle-trad</code>	3.3.I
Improved citation style <code>authortitle-trad</code>	3.3.I
Added citation style <code>authortitle-strad</code>	3.3.I
Improved bibliography style <code>authoryear</code>	3.3.2
Improved bibliography style <code>authortitle</code>	3.3.2
Added option <code>maxnames</code> to <code>\printbibliography</code>	3.5.I
Added option <code>minnames</code> to <code>\printbibliography</code>	3.5.I
Added option <code>maxnames</code> to <code>\bibbysection</code>	3.5.I
Added option <code>minnames</code> to <code>\bibbysection</code>	3.5.I
Added option <code>maxnames</code> to <code>\bibbysegment</code>	3.5.I
Added option <code>minnames</code> to <code>\bibbysegment</code>	3.5.I
Added option <code>maxnames</code> to <code>\bibbycategory</code>	3.5.I
Added option <code>minnames</code> to <code>\bibbycategory</code>	3.5.I

Added option maxnames to \printshorthands	3.5.2
Added option minnames to \printshorthands	3.5.2
Renamed bibsection to refsection (conflict with memoir)	3.5.3
Renamed bibsegment to refsegment (consistency)	3.5.4
Extended refsection environment	3.5.3
Renamed bibsection counter to refsection	4.9.5
Renamed bibsegment counter to refsegment	4.9.5
Updated documentation	3.10.3
Added counter citecount	4.9.5
Modified default definition of \blxauxprefix	3.10.2
Added \CopyFieldFormat	4.4.2
Added \CopyIndexFieldFormat	4.4.2
Added \CopyListFormat	4.4.2
Added \CopyIndexListFormat	4.4.2
Added \CopyNameFormat	4.4.2
Added \CopyIndexNameFormat	4.4.2
Added \clearfield	4.5.I
Added \clearlist	4.5.I
Added \clearname	4.5.I
Added \restorefield	4.5.I
Added \restorelist	4.5.I
Added \restorename	4.5.I
Renamed \bibhyperlink to \bibhyperref	4.5.4
Added new command \bibhyperlink	4.5.4
Added \bibhypertarget	4.5.4
Renamed formatting directive bibhyperlink to bibhyperref	4.9.4
Added new formatting directive bibhyperlink	4.9.4
Added formatting directive bibhypertarget	4.9.4
Added \addlpthinspace	4.6.4
Added \addhpthinspace	4.6.4
Added field annotator	2.2.2
Added field commentator	2.2.2
Added field introduction	2.2.2
Added field foreword	2.2.2
Added field afterword	2.2.2
Updated documentation of field translator	2.2.2
Added field articleid	2.2.2
Added field doi	2.2.2
Added field file	2.2.2
Added field alias pdf	2.2.5
Added field indextitle	2.2.2
Added field indexsorttitle	2.2.3
Changed data type of language	2.2.2
Changed data type of origlanguage	2.2.2
Updated documentation of entry type book	2.I.I
Updated documentation of entry type collection	2.I.I

Updated documentation of entry type inbook	2.I.I
Updated documentation of entry type incollection	2.I.I
Extended entry type misc	2.I.I
Added \UndefineBibliographyExtras	3-7
Added \UndeclareBibliographyExtras	4.8.I
Added \finalandcomma	3.8.2
Added localization key citedas	4.8.2
Renamed localization key editby to edited	4.8.2
Renamed localization key transby to translated	4.8.2
Added localization key annotated	4.8.2
Added localization key commented	4.8.2
Added localization key introduced	4.8.2
Added localization key foreworded	4.8.2
Added localization key afterworded	4.8.2
Added localization key commentary	4.8.2
Added localization key annotations	4.8.2
Added localization key introduction	4.8.2
Added localization key foreword	4.8.2
Added localization key afterword	4.8.2
Added localization key doneby	4.8.2
Added localization key itemby	4.8.2
Added localization key spanish	4.8.2
Added localization key latin	4.8.2
Added localization key greek	4.8.2
Modified localization key fromenglish	4.8.2
Modified localization key fromfrench	4.8.2
Modified localization key fromgerman	4.8.2
Added localization key fromspanish	4.8.2
Added localization key fromlatin	4.8.2
Added localization key fromgreek	4.8.2
Expanded documentation	2.3
Updated documentation	3.3.I
Updated documentation	3.3.2
Updated documentation	3.8.I
Updated documentation	4.9.I
Updated and completed documentation	3.8.2
Updated and completed documentation	4.9.2
Added support for Spanish (translations by Ignacio Fernández Galván)	
Various memory-related optimizations in biblatex.bst	

0.4 2006-10-01

Added package option sortlos	3.I.2
Added package option bibtex8	3.I.3
Made pageref field local to refsection environment	4.2.4
Renamed field labeltitle to labelctitle	4.2.4
Added new field labeltitle	4.2.4

Added new field sortkey	2.2.3
Updated documentation	3.4
Removed <code>\iffieldtrue</code>	4.5.2
Renamed counter <code>namepenalty</code> to <code>highnamepenalty</code>	3.8.3
Added counter <code>lownamepenalty</code>	3.8.3
Added documentation of <code>\noligature</code>	3.8.4
Added <code>\addlowpenpace</code>	4.6.4
Added <code>\addhighpenpace</code>	4.6.4
Added <code>\addabbrvspace</code>	4.6.4
Added <code>\adddotspace</code>	4.6.4
Added <code>\addslash</code>	4.6.4
Expanded documentation	3-II
Various minor improvements throughout	
Fixed some bugs	

0.3 2006-09-24

Renamed citation style <code>authortitle</code> to <code>authortitle-terse</code>	3.3.I
Renamed citation style <code>authortitle-comp</code> to <code>authortitle-cterse</code>	3.3.I
Renamed citation style <code>authortitle-verb</code> to <code>authortitle</code>	3.3.I
Added new citation style <code>authortitle-comp</code>	3.3.I
Citation style <code>traditional</code> now supports ‘loc. cit.’	3.3.I
Added package option <code>date</code>	3.I.2
Added package option <code>urldate</code>	3.I.2
Introduced new data type: literal lists	2.2
Renamed <code>\citename</code> to <code>\citeauthor</code>	3.6.5
Renamed <code>\citelist</code> to <code>\citename</code>	3.6.7
Added new <code>\citelist</code> command	3.6.7
Renamed <code>\printlist</code> to <code>\printnames</code>	4.4.I
Added new <code>\printlist</code> command	4.4.I
Renamed <code>\indexlist</code> to <code>\indexnames</code>	4.4.I
Added new <code>\indexlist</code> command	4.4.I
Renamed <code>\DeclareListFormat</code> to <code>\DeclareNameFormat</code>	4.4.2
Added new <code>\DeclareListFormat</code> command	4.4.2
Renamed <code>\DeclareListAlias</code> to <code>\DeclareNameAlias</code>	4.4.2
Added new <code>\DeclareListAlias</code> command	4.4.2
Renamed <code>\DeclareIndexListFormat</code> to <code>\DeclareIndexNameFormat</code>	4.4.2
Added new <code>\DeclareIndexListFormat</code> command	4.4.2
Renamed <code>\DeclareIndexListAlias</code> to <code>\DeclareIndexNameAlias</code>	4.4.2
Added new <code>\DeclareIndexListAlias</code> command	4.4.2
Renamed <code>\biblist</code> to <code>\thename</code>	4.5.I
Added new <code>\thelist</code> command	4.5.I
Renamed <code>\bibfield</code> to <code>\thefield</code>	4.5.I
Renamed <code>\savelist</code> to <code>\savename</code>	4.5.I
Added new <code>\savelist</code> command	4.5.I
Renamed <code>\savelistcs</code> to <code>\savenamecs</code>	4.5.I
Added new <code>\savelistcs</code> command	4.5.I

Renamed <code>\iflistundef</code> to <code>\ifnameundef</code>	4.5.2
Added new <code>\iflistundef</code> test	4.5.2
Renamed <code>\iflistsequal</code> to <code>\ifnameequal</code>	4.5.2
Added new <code>\iflistsequal</code> test	4.5.2
Renamed <code>\iflistequals</code> to <code>\ifnameequals</code>	4.5.2
Added new <code>\iflistequals</code> test	4.5.2
Renamed <code>\iflistequalcs</code> to <code>\ifnameequalcs</code>	4.5.2
Added new <code>\iflistequalcs</code> test	4.5.2
Renamed <code>\iflistequalstr</code> to <code>\ifnameequalstr</code>	4.5.2
Added new <code>\iflistequalstr</code> test	4.5.2
Renamed <code>\ifcurrentlist</code> to <code>\ifcurrentname</code>	4.5.2
Added new <code>\ifcurrentlist</code> test	4.5.2
Entry type alias <code>@conference</code> now resolved by BibTeX	2.I.2
Entry type alias <code>@mastersthesis</code> now resolved by BibTeX	2.I.2
Entry type alias <code>@phdthesis</code> now resolved by BibTeX	2.I.2
Entry type alias <code>@techreport</code> now resolved by BibTeX	2.I.2
Entry type alias <code>@www</code> now resolved by BibTeX	2.I.2
Added new custom fields <code>lista</code> through <code>listf</code>	2.2.4
Changed data type of <code>location</code>	2.2.2
Changed data type of <code>origlocation</code>	2.2.2
Changed data type of <code>publisher</code>	2.2.2
Changed data type of <code>institution</code>	2.2.2
Changed data type of <code>organization</code>	2.2.2
Modified values of <code>gender</code> field for jurabib compatibility	2.2.3
Modified and extended <code>idem...</code> keys for jurabib compatibility	4.8.2
Improved <code>\addtocategory</code>	3.5.5
Removed formatting command <code>\mkshorthand</code>	3.8.I
Added field formatting directive <code>shorthandwidth</code>	4.9.4
Added documentation of <code>\shorthandwidth</code>	4.9.5
Removed formatting command <code>\mklabelnumber</code>	3.8.I
Added field formatting directive <code>labelnumberwidth</code>	4.9.4
Added documentation of <code>\labelnumberwidth</code>	4.9.5
Removed formatting command <code>\mklabelalpha</code>	3.8.I
Added field formatting directive <code>labelalphawidth</code>	4.9.4
Added documentation of <code>\labelalphawidth</code>	4.9.5
Renamed <code>\bibitem</code> to <code>\thebibitem</code>	4.2.2
Renamed <code>\lositem</code> to <code>\thelositem</code>	4.2.2
Modified <code>\AtBeginBibliography</code>	4.9.6
Added <code>\AtBeginShorthands</code>	4.9.6
Added <code>\AtEveryLositem</code>	4.9.6
Extended <code>showkeys</code> compatibility to list of shorthands	1.6.3
Added compatibility code for the <code>hyperref</code> package	1.6.3
Added package option <code>hyperref</code>	3.I.2
Added package option <code>backref</code>	3.I.2
Added field <code>pageref</code>	4.2.4
Added <code>\ifhyperref</code>	4.5.4

Added <code>\bibhyperlink</code>	4.5.4
Added field formatting directive <code>bibhyperlink</code>	4.9.4
Renamed <code>\ifandothers</code> to <code>\ifmorenames</code>	4.5.2
Added new <code>\ifandothers</code> test	4.5.2
Removed field <code>moreauthor</code>	4.2.4
Removed field <code>morebookauthor</code>	4.2.4
Removed field <code>moreeditor</code>	4.2.4
Removed field <code>morelabelname</code>	4.2.4
Removed field <code>moretranslator</code>	4.2.4
Removed field <code>morenamea</code>	4.2.4
Removed field <code>morenameb</code>	4.2.4
Removed field <code>morenamec</code>	4.2.4
Updated documentation	4.I
Updated documentation	4.2.I
Updated documentation	4.2.2
Updated documentation	4.2.3
Expanded documentation	4.9
Modified internal BibTeX interface	
Fixed some typos in the manual	
Fixed some bugs	

0.2 2006-09-06

Added bibliography categories	3-5.5
Added <code>\DeclareBibliographyCategory</code>	3-5.5
Added <code>\addtocategory</code>	3-5.5
Added category and <code>notcategory</code> filters	3-5.I
Added <code>\bibbycategory</code>	3-5.I
Added usage examples for bibliography categories	3-10.4
Added documentation of configuration file	3-2.I
Added documentation of <code>\ExecuteBibliographyOptions</code>	3-2.2
Added documentation of <code>\AtBeginBibliography</code>	4-9.6
Added <code>\AtEveryBibitem</code>	4-9.6
Added <code>\AtEveryCite</code>	4-9.6
Added <code>\AtEveryCitekey</code>	4-9.6
Added optional argument to <code>\printtext</code>	4-4.I
Added <code>\ifpage</code>	4-5.2
Added <code>\ifpages</code>	4-5.2
Added field <code>titleaddon</code>	2-2.2
Added field <code>booktitleaddon</code>	2-2.2
Added field <code>maintitleaddon</code>	2-2.2
Added field <code>library</code>	2-2.2
Added field <code>part</code>	2-2.2
Added field <code>origlocation</code>	2-2.2
Added field <code>origtitle</code>	2-2.2
Added field <code>origyear</code>	2-2.2
Added field <code>origlanguage</code>	2-2.2

Modified profile of field language	2.2.2
Extended entry type @book	2.1.1
Extended entry type @inbook	2.1.1
Extended entry type @collection	2.1.1
Extended entry type @incollection	2.1.1
Extended entry type @proceedings	2.1.1
Extended entry type @inproceedings	2.1.1
Added entry type alias @www	2.1.2
Added compatibility code for the showkeys package	1.6.3
Support printable characters in keyword and notkeyword filters	3.5.1
Support printable characters in keywords field	2.2.3
Ignore spaces after commas in keywords field	2.2.3
Internal rearrangement of all bibliography styles	
Fixed various bugs	

0.1 2006-09-02

Initial public release